



HOUSE OF LORDS

Library Note

Debate on 16 December: *Deepwater Horizon* and its Implications

This Library Note aims to provide background reading for the debate to be held on Thursday 16 December:

“The implications of the *Deepwater Horizon* oil spill in the Gulf of Mexico”

This Note provides an overview of the *Deepwater Horizon* oil spill on 20 April 2010, and the subsequent investigations into the causes of the disaster and the response of those involved. It then examines the possible implications of the spill for offshore drilling and regulation in the US, Europe and the UK.

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1. Introduction

In the evening of 20 April 2010 an explosion occurred on the *Deepwater Horizon* semi-submersible drilling platform in the Gulf of Mexico. That explosion, and the subsequent fire aboard the rig, resulted in the death of 11 people and injury to a number of others. The rig was fully evacuated following the blast, and though attempts were made to contain the fire, the platform sank into the Gulf two days later on 22 April. A mile beneath the surface of the water, oil was gushing from the Macondo 252 exploration well drilled by *Deepwater Horizon*, the deepest that any oil well blowout had occurred before. Estimates differ on how much oil issued from the well in the 87 days which it took to seal the well. However, according to the US National Incident Command's Flow Rate Technical Group estimate of 2 August 2010, approximately 206 million gallons of oil (4.9 million barrels) were released before the well was contained on 15 July (the well was not officially declared 'dead' by the US Government until 19 September 2010). This would make *Deepwater Horizon* certainly the largest oil spill ever seen in United States coastal waters (the previous largest was the 1989 Exxon Valdez spill at 11 million gallons) and possibly the largest peace-time oil spill in history.¹

Deepwater Horizon was owned and operated by Transocean, an offshore drilling company, and leased to BP Plc, one of the world's largest oil companies. At the time of the explosion, BP and Transocean were in the process of closing the well in anticipation of later production, and US construction company Halliburton had recently completed cementing of casings in the well. The causes of the crisis at *Deepwater Horizon* on 20 April, the subsequent clean-up operation and attempt to stem the flow of hydrocarbons (oil and gas) from the Macondo well on the ocean floor, and who is ultimately responsible for the disaster, have been the subject of considerable contention. Alongside internal investigations by BP, Transocean and Halliburton, to date in the United States two official investigations into *Deepwater Horizon* remain ongoing, the House of Representatives has conducted at least 33 hearings in ten committees, the Senate 30 hearings in eight committees, and Senators and Members of Congress have introduced over 150 legislative proposals which included one or more provisions that would affect oil spill policy.²

In order to examine the *Deepwater Horizon* crisis, and the subsequent technical, regulatory and political response, this Note provides a timeline of significant events from 20 April to the present, including extracts from key reports, testimony provided at Congressional hearings, and interim findings from the official enquiries. Then some of the key consequences and issues resulting from *Deepwater Horizon* and wider industry and regulatory moves are examined, with a particular focus on offshore drilling in the UK and the possible implications for the future.

¹ The largest oil spill recorded in history was that which resulted from the destruction of the oil fields in Kuwait during the first Iraq war, when 240 million gallons were spilled according to the Oil Spill Intelligence Report: http://articles.cnn.com/2010-05-27/us/oil.spill.amount_1_oil-spill-intelligence-report-exxon-valdez-oil-rig-explosion?_s=PM:US. The largest previous peacetime oil spill was thought to be the 1979 Ixtoc I disaster in Mexico, where 350 million litres or 3,500,000 barrels of oil were released into the ocean.

² Congressional Research Service paper, *Oil Spill Legislation in the 111th Congress* (15 October 2010) (figures as at time of publication).

2. Timeline of Events

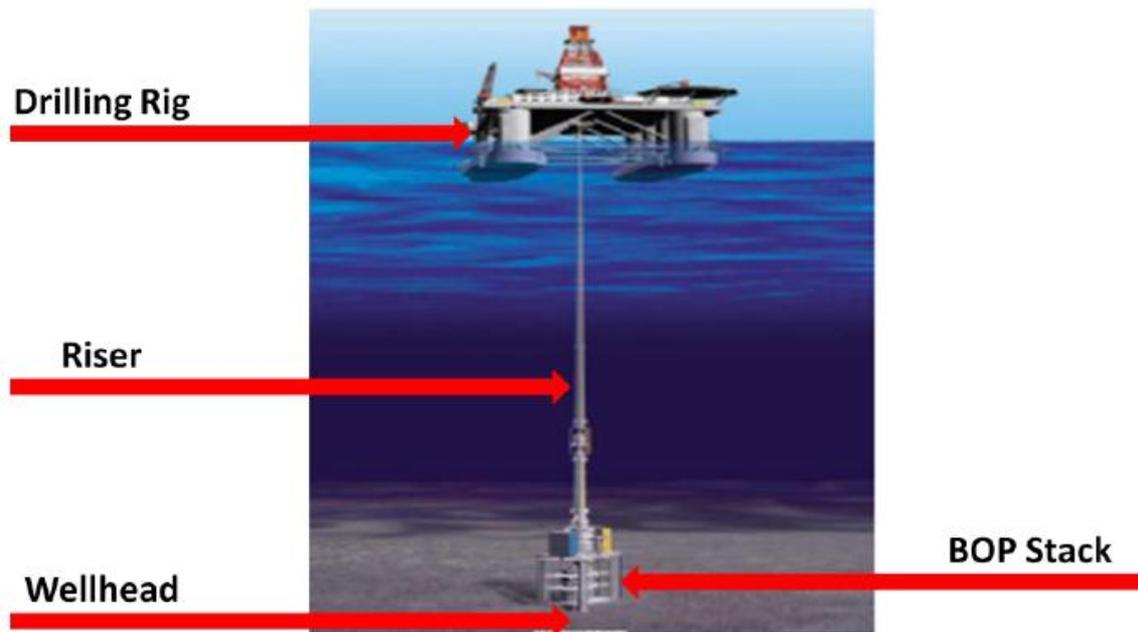
20–22 April 2010

There is an explosion on the *Deepwater Horizon* oil platform, causing 11 fatalities and the rig to sink. Millions of gallons of oil begin to be released into the Gulf of Mexico.

Almost immediately following the explosion, while firefighting operations continued on the surface, Transocean and BP begin working to stop the flow of hydrocarbons from the Macondo well. Key to those efforts is the status of the blowout preventer ('BOP'), the device on the ocean floor at the top of the well (or wellhead) designed to be the last and most crucial defence against a blowout. The BOP contains five 'rams' each of which serve different purposes, the most crucial of which being the 'blind shear' ram which is designed to be capable of cutting through the drill pipe and completely shutting off the well. All attempts to activate the blind shear ram however, both from a control room on the surface and using remote operated vehicles underwater, are unsuccessful (BP ceased trying to close the BOP stack entirely on 5 May). Two leaks in the pipeline (or riser) above the well are discovered, one directly above the BOP and another at the end of the pipeline on the ocean floor where it had fallen following the sinking of *Deepwater Horizon*.

The diagram below illustrates the position of the BOP in relation to the rig above:

Figure 1.A: Above the Sea Floor (Not to Scale)⁵



(Source: Extract from *Stopping the Spill: The Five Month Effort to kill the Macondo Well*, published by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. Image Provided by BP)

24 April 2010

The first estimate into the amount of oil and gas leaking from the Macondo well is provided. Officials from BP and the US Coast Guard estimate that oil is leaking from the well at a rate of 1,000 barrels per day (bbl/day).³

27 April 2010

As the flow of oil from the *Deepwater Horizon* site continues, Janet Napolitano, US Secretary of State for Homeland Security, and Ken Salazar, US Secretary of the Interior, announce a joint investigation into the incident to be conducted by the US Minerals Management Service (MMS) and the US Coast Guard. The team conducting the investigation is given nine months from the date of the convening order (27 April) to submit a final report.⁴

28 April 2010

An estimate released by the National Oceanic and Atmospheric Administration (NOAA) places the flow rate of oil being released from the Macondo Well at approximately 5,000 barrels per day (bbls/day)⁵ (an increase of 4,000 bbls/day on the estimate released on 24 April).

3 May 2010

Work begins on drilling a relief well to isolate the leak at the *Deepwater Horizon* site, but it is expected to take some time before it is completed.⁶

6–8 May 2010

BP attempts to lower a specially made 'cofferdam', or large containment dome 14 feet wide, 24 feet long, 40 feet tall and weighing 98 tons, onto the sea floor and collect the oil from the largest of the two leaks at the end of the riser pipe. The hydrocarbons collected would then be fed via a pipeline to the surface. A key challenge with attempting the cofferdam was the risk that methane gas escaping from the well would, as a result of both low temperatures and high pressure, clog the cofferdam with hydrocarbon ice. BP planned to mitigate this effect once the dome had been installed by pumping in warm water from the surface. However, those working on the cofferdam had failed to anticipate the volume of hydrocarbon ice which would accumulate whilst the cofferdam was being moved into position (before it was above the leak). The resultant build up of hydrocarbons blocked the opening in the dam where the oil was due to be funnelled through, and rendered the dam buoyant even as it was still being lowered. In the face of these issues the cofferdam was deemed a failure and other avenues were pursued.⁷

³ Bloomberg, 3 August 2010: <http://www.bloomberg.com/news/2010-08-03/bp-s-gulf-of-mexico-oil-spill-ranks-as-world-s-worst-caused-by-an-accident.html>.

⁴ Department for Homeland Security, 'Secretary Napolitano and Secretary Salazar Launch Full Investigation of Deepwater Horizon Incident in the Gulf of Mexico', 27 April 2010: http://www.dhs.gov/ynews/releases/pr_1272395702575.shtm.

⁵ National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling, *The Amount and Flow of Oil*: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>.

⁶ BP was initially optimistic that the relief well could be completed by mid-July; however it was forced to subsequently revise this estimate.

⁷ National Commission on the BP *Deepwater Horizon* Spill and Offshore Drilling, *Stopping the Spill—the five-month effort to kill the Macondo well* (Staff Working Paper Number 6, Autumn 2010).

12 May 2010

Senior Vice-President for the Gulf of Mexico for BP, James Dupree, testifies before the Sub-committee on Oversight and Investigations, a Sub-committee of the Committee on Energy and Commerce. During that testimony Mr Dupree says that pressure tests conducted on the Macondo well before the explosion showed “discrepancies”. Chair of the Committee, Congressman Henry Waxman, states that material seen by the Committee illustrated an internal debate between BP and Transocean employees took place regarding how to proceed after the test.⁸

18 May 2010

Chief Executive of BP, Tony Hayward, attempts to allay environmental fears by stating that the impact of the spill on the Gulf of Mexico will be “very, very modest”.⁹

22 May 2010

President Obama establishes the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling. The Commission is charged with examining the facts and circumstances to determine the cause of the *Deepwater Horizon* oil disaster and to develop options for guarding against future oil spills associated with offshore drilling. The Commission is expected to submit a final public report to the President with its findings within 6 months of the Commission’s first meeting.¹⁰

26–28 May 2010

Following the failure of the cofferdam, BP’s next attempt to prevent the flow of oil and gas from the Macondo well was a ‘top kill’ and ‘junk shot’. Both standard industry procedures for blocking blown-out wells, a top kill involves pumping heavy drilling mud through the top of the blowout preventer at a rate of pressure such that it forces oil and gas back down the lines and into the oil reservoir beneath. The ‘junk shot’ complements this by pumping bridging materials—such as tennis balls and tyre rubber for example—into the bottom of the BOP, aiming to create a further barrier and obstruction to the flow of oil. Despite three attempts over three consecutive days however (and at increasing pressure being applied to the drilling mud and ‘junk’ in an attempt to force it harder and faster into the well), again this did not succeed.¹¹

27 May 2010

The Flow Rate Group established by the Unified Command overseeing the spill publishes its first estimate on the rate that oil was flowing from the Macondo well. It

⁸ *Daily Telegraph*, 12 May 2010:

<http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7716446/BP-rigs-safety-valve-failed-test-before-oil-spill-explosion.html>; *Business Week*, 12 May 2010:

<http://www.businessweek.com/news/2010-05-12/bp-tells-congress-gulf-well-failed-tests-before-blast-update2-.html>.

⁹ *Daily Telegraph*, 18 May 2010:

<http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7737805/Gulf-of-Mexico-oil-spill-BP-insists-oil-spill-impact-very-modest.html>.

¹⁰ National Commission on the BP *Deepwater Horizon* and Offshore Drilling:

<http://www.oilspillcommission.gov/>.

¹¹ National Commission on the BP *Deepwater Horizon* Spill and Offshore Drilling, *Stopping the Spill—the five-month effort to kill the Macondo well* (Staff Working Paper Number 6, Autumn 2010).

states that hydrocarbons are likely to be being released at a rate of 12,000 to 25,000 bbls/day.¹²

28 May 2010

US Secretary of the Interior, Ken Salazar, announces a six month moratorium on all pending, current, or approved offshore drilling operations of new deepwater wells in the Gulf of Mexico and the Pacific region.¹³

1–3 June 2010

In the wake of the failure of the top kill, BP moves back towards a containment strategy and to collect the oil spewing from the well, rather than seek to impede the flow. To do this they sought to employ a 'top hat' collection device, which would feed oil via a riser to the *Discovery Enterprise* collection vessel on the surface. After severing the riser pipe directly above the BOP, on 3 June the top hat was installed and nearly 15,000 barrels a day of oil and gas were being successfully channelled up to the *Discovery Enterprise*. Despite this success however it quickly became apparent that the capacity of the top hat and the *Discovery Enterprise* was not sufficient for BP to maintain that it was collecting the 'vast majority of the oil' released.¹⁴

10 June 2010

The Flow Rate Group publishes a revised estimate on flow rate, now placing the flow at 25,000 to 30,000 bbls/day with a lower bound of 20,000 and a higher bound of 40,000 bbls/day.¹⁵

14 June 2010

In a letter from the Chairman and Sub-committee Chairman of the Committee on Energy and Commerce to Tony Hayward ahead of his appearance before the Committee, BP are accused of making "multiple decisions for economic reasons that increased the danger of a catastrophic well failure".¹⁶ The letter adds:

In several instances, these decisions appear to violate industry guidelines and were made despite warnings from BP's own personnel and its contractors. In

¹² National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling, *The Amount and Flow of Oil*: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>.

¹³ Department of the Interior press release, 28 May 2010:

<http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&PageID=33715>

¹⁴ Remarks by Tony Hayward, former Chief Executive of BP, BBC News, 6 June 2010: <http://www.bbc.co.uk/news/10248409>; National Commission on the BP *Deepwater Horizon* Spill and Offshore Drilling, *Stopping the Spill—the five-month effort to kill the Macondo well* (Staff Working Paper Number 6, Autumn 2010).

¹⁵ National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling, *The Amount and Flow of Oil*: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>.

¹⁶ Letter to Tony Hayward, 14 June 2010:

<http://energycommerce.house.gov/documents/20100614/Hayward.BP.2010.6.14.pdf>; *The Independent*, 15 June 2010: <http://www.independent.co.uk/news/world/americas/bp-ignored-warnings-and-cut-corners-says-congress-2000541.html>.

effect, it appears that BP repeatedly chose risky procedures in order to reduce costs and save time and made minimal efforts to contain the added risk.¹⁷

The letter announces that the Committee plans to focus on five ‘crucial decisions’ made by BP:

1. the decision to use a well design with few barriers to gas flow;
2. the failure to use a sufficient number of “centralizers” to prevent channeling during the cement process;
3. the failure to run a cement bond log to evaluate the effectiveness of the cement job;
4. the failure to circulate potentially gas-bearing drilling muds out of the well; and
5. the failure to secure the wellhead with a lockdown sleeve before allowing pressure on the seal from below.

The letter adds that “the common feature of these five decisions is that they posed a trade-off between cost and well safety”.¹⁸

15 June 2010

US President Barack Obama uses his first address from the Oval Office of his Presidency to outline the response to *Deepwater Horizon*, saying “we will make BP pay for the damage their company has caused”.¹⁹

On the same day the Flow Rate Group publishes another rate estimate, again increasing the amount of oil that it estimates is being released by the Macondo well. The new flow rate figure puts the amount of oil being released at between 35,000 to 60,000 bbls/day.²⁰

16 June 2010

After a four hour meeting at the White House, BP agrees to suspend dividend payments for the rest of the year and agrees to finance a \$20 billion (£13.5 billion) clean up and compensation fund for the Gulf of Mexico spill.²¹

17 June 2010

Chief Executive of BP, Tony Hayward, gives evidence in a seven hour session of the Congressional Sub-committee on Oversight and Investigations of the House Committee on Energy and Oversight. In his testimony, Mr Hayward states:

The explosion and fire aboard the *Deepwater Horizon* and the resulting oil spill in the Gulf of Mexico never should have happened—and I am deeply sorry that they did. None of us yet knows why it happened.

¹⁷ Letter to Tony Hayward, 14 June 2010:

<http://energycommerce.house.gov/documents/20100614/Hayward.BP.2010.6.14.pdf>.

¹⁸ *Ibid.*

¹⁹ President of the United States, Barack Obama, Remarks to the Nation on the BP Oil Spill, 15 June 2010: <http://www.whitehouse.gov/the-press-office/remarks-president-nation-bp-oil-spill>.

²⁰ National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling, *The Amount and Flow of Oil*: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>.

²¹ *Daily Telegraph*, 17 June 2010:

<http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7834096/Oil-spill-BP-suspends-dividend-to-pay-for-20bn-clean-up-fund.html>.

I want to acknowledge the questions that you and the public are rightly asking. How could this happen? How damaging is the spill to the environment? Why is it taking so long to stop the flow of oil and gas into the Gulf?

And questions are being asked about energy policy more broadly: Can we as a society explore for oil and gas in safer and more reliable ways? What is the appropriate regulatory framework for the industry?

We don't yet have answers to all these important questions. But I hear the concerns, fears, frustrations—and anger—being voiced across the country. I understand it, and I know that these sentiments will continue until the leak is stopped, and until we prove through our actions that we will do the right thing. Our actions will mean more than words, and we know that, in the end, we will be judged by the quality of our response. Until this happens, no words will be satisfying.

... BP is a “responsible party” under the Oil Pollution Act. This means that federal law requires BP, as one of the working interest owners of Mississippi Canyon 252, to pay to clean up the spill and to compensate for the economic and environmental impacts of the spill. Let me be clear: BP has accepted this responsibility and will fulfil this obligation. We have spent nearly \$1.5 billion so far, and we will not stop until the job is done

... Our internal investigation was launched on April 21, 2010 and is being conducted by BP's Head of Group Safety and Operations.

The investigation team's work thus far suggests that this accident was brought about by the apparent failure of a number of processes, systems and equipment. While the team's work is not done, it appears that there were multiple control mechanisms—procedures and equipment—in place that should have prevented this accident or reduced the impact of the spill. The investigation is focused on the following seven mechanisms:

1. The cement that seals the reservoir from the well;
2. The casing system, which seals the well bore;
3. The pressure tests to confirm the well is sealed;
4. The execution of procedures to detect and control hydrocarbons in the well, including the use of the blowout preventer (BOP) and the maintenance of that BOP;
5. The BOP Emergency Disconnect System, which can be activated by pushing a button at multiple locations on the rig;
6. The automatic closure of the BOP after its connection is lost with the rig; and;
7. Features in the BOP to allow ROVs to close the BOP and thereby seal the well at the seabed after a blowout.

I understand people want a simple answer about why this happened and who is to blame. The truth, however, is that this is a complex accident, caused by an unprecedented combination of failures. A number of companies are involved, including BP, and it is simply too early to understand the cause. There is still extensive work to do.”²²

²² Tony Hayward, testimony to the US House of Representatives Committee on Energy and Commerce, Sub-committee on Oversight and Investigations, 17 June 2010.

In his remarks, the Chair of the Sub-committee, Congressman Henry Waxman, states that the Committee had reviewed 30,000 pages of documents from BP. However, he said to Mr Hayward that within those documents “not a single [one] shows you paid even the slightest attention to the dangers at [the *Deepwater Horizon*] well”. He added that BP’s “corporate complacency was astonishing” and that warnings of problems prior to 20 April “fell on deaf ears”.²³

18 June 2010

Jim Hackett, CEO of Anadarko Petroleum Corporation, BP’s partner company in the exploratory drilling in the Gulf of Mexico, releases a press statement criticising BP and the decisions made on the *Deepwater Horizon* project. Mr Hackett states:

The mounting evidence clearly demonstrates that this tragedy was preventable and the direct result of BP’s reckless decisions and actions. Frankly, we are shocked by the publicly available information that has been disclosed in recent investigations and during this week’s testimony that, among other things, indicates BP operated unsafely and failed to monitor and react to several critical warning signs during the drilling of the Macondo well. BP’s behaviour and actions likely represent gross negligence or wilful misconduct and thus affect the obligations of the parties under the operating agreement.²⁴

22 June 2010

A federal judge in New Orleans grants an injunction blocking the six month moratorium on deepwater drilling in the Gulf of Mexico and Pacific waters ordered by the Secretary of the Interior.²⁵

8 July 2010

The Obama administration loses an appeal to have the federal injunction blocking a moratorium on deepwater drilling overturned.²⁶

9 July 2010

European Energy Commissioner, Gunther Oettinger, calls for a ‘de facto’ moratorium on deepwater drilling in Europe until regulations are put in place to prevent accidents such as the *Deepwater Horizon* crisis occurring in future. In remarks prepared for a speech in the European Parliament Mr Oettinger said:

Until the exact causes are known, the precautionary principle should prevail.

Given the current circumstances, any responsible government would at present practically freeze new permits for drilling with extreme parameters and conditions.²⁷

²³ Congressman Henry Waxman, US House of Representatives Committee on Energy and Commerce, Sub-committee on Oversight and Investigations, 17 June 2010.

²⁴ Anadarko press release, 18 June 2010: www.anadarko.com.

²⁵ Nola, 22 June 2010: http://www.nola.com/news/gulf-oil-spill/index.ssf/2010/06/deepwater_drilling_moratorium_4.html.

²⁶ Reuters, 8 July 2010: <http://www.reuters.com/article/idUSN0820574620100708>

²⁷ *Financial Times*, 9 July 2010, p 9.

10–15 July 2010

BP's next move at the *Deepwater Horizon* site, and the one that was to finally prove the solution to preventing the flow of hydrocarbons from the Macondo well, is a 'capping stack'. Like the blowout preventer though smaller in scale, the capping stack contains 3 rams capable of shutting off the flow of oil and gas from the well. From 10 June the operation commences to remove the top hat on top of the blowout preventer and to install the capping stack in its place. Following tests on the integrity of the well the rams on the capping stack are closed, sealing off the flow of hydrocarbons. On 15 July BP announces that the Macondo well had been capped, and the flow of oil into the Gulf of Mexico stopped for the first time in 87 days.²⁸

22 July 2010

Four of the world's largest oil companies—ExxonMobil, Royal Dutch Shell, Chevron and Conoco-Phillips—announce the establishment of a \$1 billion joint venture to develop a Gulf of Mexico oil spill response and containment system.²⁹

24 July 2010

Michael Williams, a Chief Technician at Transocean, testifies before a panel of investigators working as part of the Joint Investigation into *Deepwater Horizon* by the US Coastguard and the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEM)³⁰ that some alarms designed to act as early warning indicators on the rig had been turned off prior to the accident to prevent workers from being 'awoken by false alarms'.³¹

27 July 2010

BP announce the departure of Tony Hayward as Chief Executive, and a record loss of \$17 billion in second quarter results.³²

2 August 2010

In its final estimate, the Flow Rate Group places the flow of oil and gas from the Macondo well before the well was capped at 52,700 to 62,200 bbls/day. The Group estimate that within the 87 days when the flow of hydrocarbons was being released from the well, 4.9 million barrels of oil were spilled into the Gulf of Mexico.³³

3–5 August 2010

In order to address the pressure building up in the capping stack as the relief well being drilled parallel to the Macondo well is completed, on 3 August BP commences a 'static kill' operation which, like the top kill, involves pumping heavy drilling mud into the well in an effort to push oil and gas back into the reservoir below. However, because the

²⁸ *Daily Telegraph*, 16 July 2010, p 1.

²⁹ *Financial Times*, 22 July 2010, p 1.

³⁰ Formerly the Minerals Management Service (MMS).

³¹ Testimony, Michael Williams, Joint Investigation:

<http://www.coastguardd5publicaffairs.com/external/content/document/3043/856507/1/7-23-10.pdf>.

³² *Guardian*, 27 July 2010, p 4.

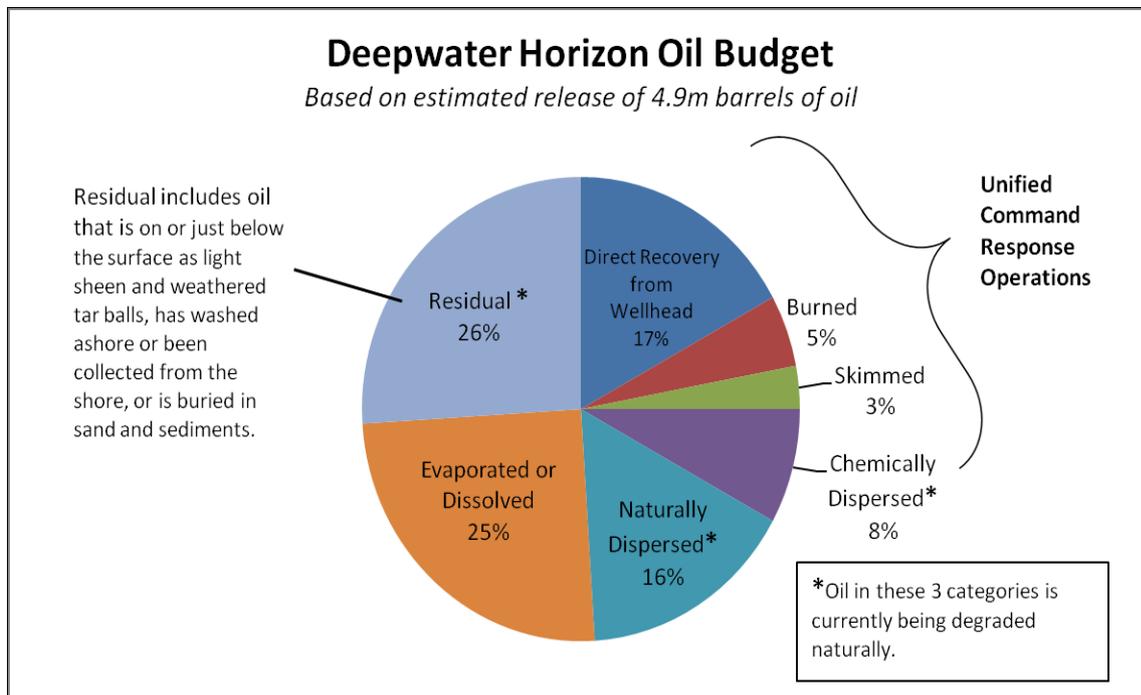
³³ National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling, *The Amount and Flow of Oil*: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>.

hydrocarbons were already static as a result of the capping stack, the pumping rates were far lower than required for a top kill. On 5 August this process was completed, the heavy drilling mud having been followed by cement, and BP achieved hydrostatic control or containment of the well.³⁴

5 August 2010

An investigation by the US National Oceanic and Atmospheric Administration (NOAA) reports that approximately three quarters of the oil leaked as a result of the *Deepwater Horizon* crisis poses no further risk to wildlife. The NOAA states that efforts to contain the spread of oil spill—including the direct recovery of oil at the well head, ‘burning’ and ‘skimming’ on the surface and dispersal with chemical sprays—have removed approximately a third of the 4.9 million barrels that it estimated were released from the Macondo well. Another 16 per cent was naturally dispersed in the water column, ‘mostly as a result of oil forming small droplets no thicker than a human hair’, and another 25 per cent of the oil had evaporated or dissolved into the seawater.³⁵ Therefore, the NOAA reports, only one quarter of oil from the spill remains a residue in the environment.³⁶

These figures are illustrated below:



(Source: <http://www.washingtonpost.com/wp-srv/politics/documents/WorkingPaperAmountandFateForRelease.pdf>)

³⁴ National Commission on the BP *Deepwater Horizon* Spill and Offshore Drilling, *Stopping the Spill—the five-month effort to kill the Macondo well* (Staff Working Paper Number 6, Autumn 2010).

³⁵ *The Independent*, 5 August 2010, p 10 and 6 August 2010, p 18; *Guardian*, 6 August 2010, p 16.

³⁶ It is also worth noting here, as reported in the *Independent* on 6 August 2010, that the oil from the Gulf of Mexico is lighter than heavy crude oil, and due to the volume of water in the Gulf dilutes faster and degrades naturally more easily. The warmer temperatures of the Gulf also help bacterial degradation.

19 August 2010

The Woods Hole Oceanographic Institute in Massachusetts reports that the oil released as a result of *Deepwater Horizon* may be larger than feared, citing a “cloud” of oil 200m thick and 1.6km (one mile) wide spreading for at least 35km from the accident site.³⁷

8 September 2010

BP publishes the results of its enquiry into *Deepwater Horizon*. Focused on the events immediately preceding the accident, the 193 page report compiled by an investigation team headed by Mark Bly concludes that there were 8 key failings related to the cause of the disaster, which if addressed would have likely either prevented or substantially mitigated its effects. Jonathan Russell of the *Daily Telegraph* provides a succinct summary of those eight points, and their implications, as follows:

Key Finding Number 1—The cement barrier did not prevent oil and gas from leaking into the wellbore. The “annulus” cement barrier” is the first line of defence against an oil leak.

The Report states: “The investigation team’s analysis identified a probable technical explanation for the failure. Interactions between BP and Halliburton and shortcomings in the planning, design, execution and confirmation of the cement job reduced the prospects for a successful cement job”.

Conclusion: Both BP and Halliburton left with questions to answer.

Key Finding Number 2—The shoe track barriers (or valves between the cement barrier and the well) did not isolate the oil leak.

The Report states: “A mechanical barrier failure enable hydrocarbon ingress to the wellbore... the shoe track cement and the float collar must have failed to prevent this ingress”.

Conclusion: Another worrying finding for Halliburton.

Key Finding Number 3—Pressure tests that should have raised concerns were ignored. Although the first stage of pressure tests on the well were good, findings from the second set of tests did not raise sufficient concerns.

The Report states: “The negative-pressure test was accepted although well integrity had not been established.”

Conclusion: Not good for Transocean, the rig operator.

Key Finding Number 4—The influx of oil and gas into the riser was not recognised early enough.

The Report states: “During all the phases of these operations, fluid returns, pressure and flow indicators should be continuously monitored to detect influx into the well as soon as possible. On the Macondo well, the rig crew apparently did not recognise significant indications of hydrocarbon influx during the displacement of the riser to seawater”.

³⁷ *The Times*, 20 August 2010; *Daily Telegraph*, 20 August 2010.

Conclusion: Again Transocean is left in the spotlight.

Key Finding Number 5—The rig crew did not act until oil and gas had entered the well riser. The actions that were taken after that did not control the well.

The Report states: “When well influx occurs, rapid response is critical. No apparent well control actions were taken until hydrocarbons were in the riser... Well control actions taken prior to the explosion suggest the rig crew was not sufficiently prepared to manage an escalating well control situation”.

Conclusion: Once again the report points the finger at Transocean.

Key Finding Number 6—The decision to divert oil and gas into a tank called the mud gas separator (MGS) resulted in gas escaping on to the rig (rather than being diverted overboard). The MGS was a low pressure system which was unable to deal with the high flow volume. This led to gas enveloping the rig within seconds of hydrocarbons reaching the surface.

The Report states: “When the rig crew diverted high flow to the MGS the system was overwhelmed”.

Conclusion: Again the rig crew, or Transocean, is the named party.

Key Finding Number 7—The fire and gas control system did not prevent an explosion. The fire prevention system on *Deepwater Horizon* was limited in design and operation because the rig was developing the well rather than pumping oil.

The Report states: “Because of the low probability of hydrocarbons being present before a well produces, only a small area of *Deepwater Horizon* was electrically classified.”

Conclusion: The finding leaves both BP and Transocean facing questions.

Key Finding Number 8—The blowout preventer (BOP) did not seal the well. Possibly the most troubling finding for Transocean. The rig operator is named through the section dealing with the blowout preventer, the last line of defence against a spill or explosion. The report finds fault with both the maintenance records of the blowout preventer, and its design.

The Report states: “None of the emergency methods available for operating the BOP were successful in isolating the wellbore. The different methods available were not fully independent; therefore, single failures could affect more than one emergency method of BOP operation... The condition of critical components... suggest the lack of a robust Transocean maintenance management system for *Deepwater Horizon* BOP”.

Conclusion: More questions for Transocean to answer.³⁸

³⁸ *Daily Telegraph*, 9 September 2010, p 5.

US Senator Ed Markey is critical of the report's findings, saying:

This report is not BP's mea culpa. Of their own eight key findings, they only explicitly take responsibility for half of one. BP is happy to slice up blame, as long as they get the smallest piece.³⁹

When questioned regarding the decision highlighted in congressional hearings to use 6 stabilisers instead of 21 to stabilise the steel casing inside the well shaft, Mr Bly states that in the view of the investigative panel this was not a cause of the accident.⁴⁰ However, despite the focus in the key findings of the report on the work done by Halliburton and Transocean, Mr Bly also points out that the report contained 26 recommendations about how BP should respond, including procedures for conducting and interpreting well tests, the capabilities of BOPs, and understanding of cementing processes.⁴¹

Also on 8 September the House of Commons Energy and Climate Change Committee holds its first evidence hearing as part of its (still ongoing) enquiry into UK deepwater drilling and the implications of the Gulf of Mexico oil spill. At that hearing representatives from Transocean, Fairfield Energy, Oil and Gas UK all argue that there is no need for a fundamental overhaul of the offshore drilling safety regime in the UK.⁴²

The possible implications of the *Deepwater Horizon* spill for deepwater drilling in the UK are explored in more detail in the following section.

19 September 2010

On 19 September 2010, 152 days after the blowout, the process of drilling the relief well is completed, and the US Government declares the Macondo well officially 'dead'. US Coast Guard Commandant Admiral Thad Allen, National Incident Commander for *Deepwater Horizon*, announces:

After months of extensive operations planning and execution under the direction and authority of the US government science and engineering teams, BP has successfully completed the relief well by intersecting and cementing the well nearly 18,000 feet below the surface. With this development, which has been confirmed by the Department of the Interior's Bureau of Ocean Energy Management, we can finally announce that the Macondo 252 well is effectively dead.⁴³

8–10 November 2010

Preliminary findings presented by Fred Bartlit, the Chief Investigator for the National Commission on the BP *Deepwater Horizon* and Offshore Drilling, suggest that no evidence was found that BP had made a conscious decision to sacrifice safety in order to save money. However, the findings did show that BP had incurred "additional risk"

³⁹ *Ibid.*

⁴⁰ *Financial Times*, 9 September 2010, p 19.

⁴¹ *Ibid.*

⁴² *Guardian*, 8 September 2010, p 26.

⁴³ Statement by National Incident Commander Admiral Thad Allen, 19 September 2010: <http://www.restorethegulf.gov/release/2010/09/19/statement-admiral-allen-successful-completion-relief-well>.

and that staff present on the rig—both BP and contractors—made poor judgements ahead of the blowout on 20 April.⁴⁴ Mr Barlit said:

To date we have not found a single instance where human beings made a conscious decision to favour dollars over safety.⁴⁵

Sean Grimsley, Mr Barlit's associate, added with regard to the pressure tests:

The well was flowing. Hydrocarbons were leaking, but for whatever reason after three hours... that night decided that it was a good negative pressure test. The question is why these experienced men out on that rig talked themselves into believing that it was a good test that established well integrity.⁴⁶

During the presentation Mr Bartlit put forward 13 preliminary conclusions regarding the fate of the well:

Preliminary Conclusions—Technical

- Flow path was exclusively through shoe track and up through casing.
- Cement (potentially contaminated or displaced by other materials) in shoe track and in some portion of annular space failed to isolate hydrocarbons.
- Pre-job laboratory data should have prompted redesign of cement slurry.
- Cement evaluation tools might have identified cementing failure, but most operators would not have run tools at that time. They would have relied on the negative pressure test.
- Negative pressure test repeatedly showed that primary cement job had not isolated hydrocarbons.
- Despite those results, BP and TO personnel treated negative pressure test as a complete success.
- BP's temporary abandonment procedures introduced additional risk.
- Number of simultaneous activities and nature of flow monitoring equipment made kick detection more difficult during riser displacement.
- Nevertheless, kick indications were clear enough that if observed would have allowed the rig crew to have responded earlier.
- Once the rig crew recognized the influx, there were several options that might have prevented or delayed the explosion and/or shut in the well.
- Diverting overboard might have prevented or delayed the explosion. Triggering the EDS prior to the explosion might have shut in the well and limited the impact of any explosion and/or the blowout.
- Technical conclusions regarding BOP should await results of forensic BOP examination and testing.
- No evidence at this time to suggest that there was a conscious decision to sacrifice safety concerns to save money.⁴⁷

Commenting on the findings presented by Mr Bartlit and the evidence heard by the investigative panel, co-chair of the Commission, Bob Graham, said it was clear that there had been "a series of almost incredible failures in the days and hours leading up to the

⁴⁴ MSNBC, 8 November 2010: http://www.msnbc.msn.com/id/40069648/ns/us_news-environment/.

⁴⁵ *Guardian*, 9 November 2010.

⁴⁶ *Ibid.*

⁴⁷ National Commission on the BP *Deepwater Horizon* and Offshore Drilling: <http://www.oilspillcommission.gov/sites/default/files/documents/Preliminary%20Conclusions.pdf>.

disaster". The other co-chair of the Commission, William Reilly, was equally critical of the safety regime aboard the *Deepwater Horizon*, saying:

[There was] emphatically not a culture of safety on that rig... I referred to a culture of complacency, and speaking for myself, all these companies we heard from (BP, Halliburton and Transocean) displayed it.⁴⁸

18 November 2010

The US National Academy of Engineering and National Research Council, again in interim findings, report that there was "insufficient consideration of risk and a lack of operating discipline" on the *Deepwater Horizon*. The panel highlighted the faulty cementing in the oil well completed by Halliburton as the crucial fault, however they also criticised the design of the well by BP.⁴⁹

23 November 2010

A draft report released by the National Commission on the BP *Deepwater Horizon* and Offshore Drilling states that neither the industry nor the US Government had made adequate investment in clean-up technology following the 1989 Exxon-Valdez spill. The report points out that the technology used in the effort to prevent the flow of oil from the Macondo well was essentially no different from that used in the aftermath of the Exxon spill, adding:

Based on the minimal information [received], we believe it is fair to assume that industry spending on in-house response R&D has been, and is currently, minimal at best.⁵⁰

6 December 2010

The Obama administration announces that it will not now allow 'scoping' of the Atlantic Coast and eastern Gulf of Mexico for offshore drilling for at least seven more years, reversing a decision taken in March.⁵¹

⁴⁸ *Guardian*, 10 November 2010, p 22.

⁴⁹ *Daily Telegraph*, 18 November 2010, p 3.

⁵⁰ *Financial Times*, 23 November 2010, p 25.

⁵¹ *Washington Post*, 6 December 2010, p 22.

3. Offshore Drilling in the UK—The Potential Ramifications of *Deepwater Horizon*

The ramifications of the *Deepwater Horizon* spill could potentially be long-lasting, both for the Gulf of Mexico, for BP and the other firms involved in the construction and maintenance of *Deepwater Horizon* and the Macondo well, and for offshore drilling across the world.⁵² As highlighted above, the House of Commons Select Committee is already in the process of an enquiry into the possible consequences of *Deepwater Horizon* in the UK, and whether the current regulatory regime needs to change to prevent such incidents from occurring in British waters.

The development of the North Sea oil fields in particular have been the subject of considerable debate and controversy. On 1 October 2010 the Department of Energy and Climate Change granted permission for Chevron to begin deepwater drilling off the coast of Britain, the first such permission to be granted since the Gulf of Mexico spill. Responding to criticism from Greenpeace that the move was irresponsible, a spokesperson for the Department said that there was a choice between the economic benefits of drilling for hydrocarbons in UK waters, which had one of the most robust safety and regulatory regimes in the world, or paying to import oil and gas from overseas.⁵³ The spokesperson added:

All lessons learnt from [BP's Macondo well] have been applied to this well and steps have been taken to prevent the specific failures on Macondo. Close scrutiny of the well will continue, by the Health and Safety Executive, by DECC and by Chevron itself.⁵⁴

This sentiment was echoed in a debate on 18 November by Minister of State for the Department of Energy and Climate Change, Charles Hendry, who said in response to concerns about offshore drilling in the UK:

[The United Kingdom] has a long record of safety. The UK was one of the first areas worldwide in which offshore exploration and production took off. We have four decades of experience. More than 10,000 wells have been drilled in UK waters, including more than 300 in waters more than 300 metres deep.

Our regulatory system has been developed to meet the evolving challenges faced by the industry... In light of the evidence [from *Deepwater Horizon*] we have taken further steps to strengthen our regulatory regime by doubling the number of environmental inspections on mobile rigs, and we are satisfied that the regime remains one of the most robust in the world.⁵⁵

3.1 Regulatory Regimes—UK, the US and Europe

Key differences exist in the regulatory regime for offshore drilling between the US and UK. Perhaps one of the most crucial of these, and one that has now been changed in the United States in the wake of the Gulf of the Mexico spill, is the distribution of regulatory functions. Following the Piper Alpha disaster in the UK, licensing for deepwater drilling was separated from health and safety and environmental oversight, so

⁵² The UK's Taskforce on Peak Oil for example has already reported that the *Deepwater Horizon* spill has significantly increased the risk of an 'oil crunch' within the next five years: <http://peakoiltaskforce.net/download-the-report/2010-peak-oil-report/>.

⁵³ As reported in the *Guardian*, 2 October 2010, p 2.

⁵⁴ *Ibid.*

⁵⁵ HC *Hansard*, 18 November 2010, cols 1162–8WH.

that the body responsible for health and safety—the Health and Safety Executive—has no financial involvement in the licensing rounds. In the US, the Minerals Management Service (MMS) was responsible for both selling the leases to drill in US waters and policing their effectiveness with regard to health and safety and environmental protection. To address concerns created by this dual functionality, including charges that it had led to the MMS being too close to the oil industry to provide effective oversight, and wider issues surrounding the response of the MMS to the *Deepwater Horizon* spill, on 19 May 2010 the Secretary of State for the Interior divided the MMS into three new offices. Each of those offices would have distinct responsibility for one of three key areas—enforcement, energy development, and revenue collection.⁵⁶ The US has also implemented a number of other regulatory changes following *Deepwater Horizon*, including the announcement on 30 September 2010 of two new ‘rules’ to help improve drilling safety:

- *The Drilling Safety Rule* makes mandatory several requirements for the drilling process, including proper cementing and casing practices and the appropriate use of drilling fluids in order to maintain well bore integrity, the first line of defense against a blowout. The regulation also strengthens oversight of mechanisms designed to shut off the flow of oil and gas, primarily the Blowout Preventer (BOP) and its components, including Remotely Operated Vehicles (ROVs), shear rams and pipe rams. Operators must also secure independent and expert reviews of their well design, construction and flow intervention mechanisms.
- *The Workplace Safety Rule* requires offshore operators to have clear programs in place to identify potential hazards when they drill, clear protocol for addressing those hazards, and strong procedures and risk-reduction strategies for all phases of activity, from well design and construction to operation, maintenance, and decommissioning.⁵⁷

At a European level, as a response to the *Deepwater Horizon* crisis as highlighted above the European Energy Commissioner, Gunther Oettinger, initially called for a ‘de facto’ moratorium on all offshore drilling; however this plan failed to receive the support of the European Parliament or the UK Government. Instead, on 13 October Mr Oettinger laid out plans for ‘comprehensive EU legislation’ aimed at ensuring safety on offshore oil platforms, stating:

Safety is non negotiable. We have to make sure that a disaster similar to the one in the Gulf of Mexico will never happen in European waters. This is why we propose that best practices already existing in Europe will become the standard throughout the European Union.⁵⁸

In the Communication, the Commission recommends specific EU legislation on oil platforms, indicating that a formal proposal could be tabled early next year. The

⁵⁶ Congressional Research Service, *Deepwater Horizon Oil Spill: Highlighted Actions and Issues*, 13 September 2010.

⁵⁷ US Department of the Interior press release, 30 September 2010: <http://www.doi.gov/news/pressreleases/Salazar-Announces-Regulations-to-Strengthen-Drilling-Safety-Reduce-Risk-of-Human-Error-on-Offshore-Oil-and-Gas-Operations.cfm>. More information on recent oil and gas reform in the US can be found here: <http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&PageID=45793>.

⁵⁸ European Commission press release, ‘Offshore oil drilling: European Commission envisages EU safety rules’, 13 October 2010: <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1324&format=HTML&aged=0&language=EN&guiLanguage=en>.

accompanying press release states that such an EU wide approach is deemed necessary, as the 'environmental, economic and social damages caused by a possible offshore accident do not know borders'.⁵⁹ Key provisions of the plans include:

- **Granting permits:** When granting licences for new drillings, Member States will have to make sure that the oil companies meet key EU requirements: Companies must have a contingency plan and prove that they have the financial means available to them to pay for environmental damage caused in the event of an accident.
- **Controls:** Oil platforms are controlled by national authorities. These supervision tasks of national authorities should be evaluated by independent experts.
- **Standards for safety equipment:** Technical standards will ensure that only control equipment meeting the highest safety standards will be allowed. This includes in particular blowout preventers.
- **Damages/Response:** Oil companies have to clean up and remedy the damage caused to the environment following an accident within a zone of maximal 200 nautical miles from the coast. The European Maritime Safety Agency (EMSA), presently focussing on pollution caused by ships will also help on those caused by oil platforms.
- **International:** The Commission will work for implementing existing international conventions and new common initiatives.⁶⁰

3.2 Safety and Environmental Protection in the UK Offshore Drilling Industry— Recent Reports and Statistics

The body responsible for overseeing the health and safety of offshore drilling in UK waters, the Health and Safety Executive, published its own response to the *Deepwater Horizon* spill, in which it outlined the safety case regime for deepwater wells in the UK including:

- A requirement for written safety cases to be prepared by the operator, and then accepted by HSE, for all mobile offshore drilling rigs operating in the UK.
- A system of well notification, where HSE reviews well design and procedures.
- A requirement for the design and construction of a well to be examined by an independent and competent specialist.
- A scheme of independent verification of offshore safety critical equipment such as blowout preventers to ensure they are fit for purpose.
- Checks that workers involved in well operations have received suitable information, instruction, training and supervision.
- Offshore inspections of well control and integrity arrangements, and related safety issues, by specialist inspectors from HSE's Offshore Division.
- Weekly drilling reports submitted to HSE by operators.⁶¹

Despite this safety regime, however, on 24 August 2010 the HSE published safety statistics which it admitted illustrated that the safety record of the offshore oil and gas industry was 'not good enough'. The figures showed that there were 50 major injuries

⁵⁹ *Ibid.*

⁶⁰ *Ibid.*

⁶¹ <http://www.hse.gov.uk/offshore/deepwater.htm>.

reported in 2009/10, up 20 on 2008/09 and higher than the average of 42 over the previous five years. The combined fatal and major injury rate almost doubled to 192 per 100,000 workers in 2009/10 compared with 106 in 2008/09 and 156 in 2007/08. A marked rise was also recorded in 2009/10 of the combined number of major and significant hydrocarbon releases (regarded as potential precursors to a major incident) with a provisional total of 85, compared with 61 in 2008/09.

These figures are further illustrated in the graphs below:

Fatal and major injuries to offshore workers

Figure 1: Fatal and Major Injuries
1997/1998–2009/2010p

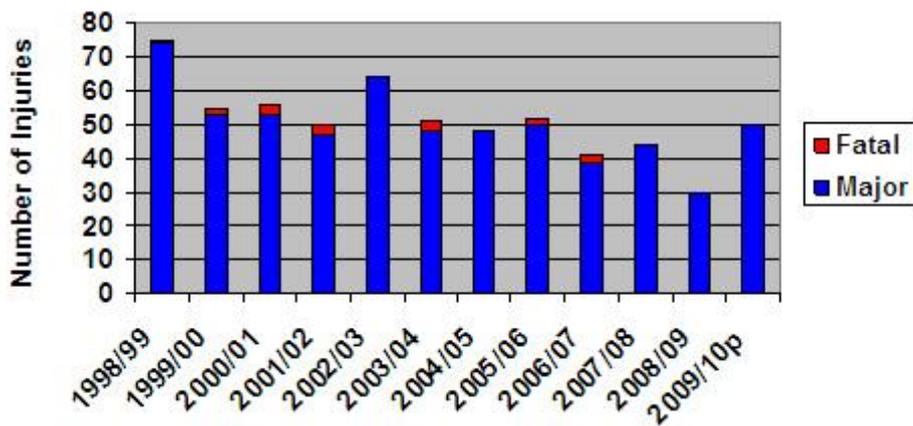
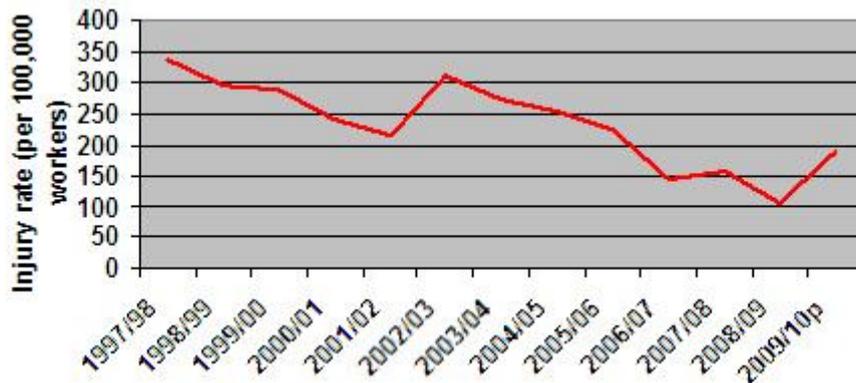


Figure 2: Combined Fatal and Major Injury Rate
1997/1998–2009/10p



(Source: Health and Safety Executive, *Offshore safety statistics bulletin 2009/10*: <http://www.hse.gov.uk/offshore/statistics/stat0910.htm>)

Commenting on the figures, the Head of HSE’s Offshore Division, Steve Walker, said:

I am pleased to see no fatalities for a third consecutive year in the areas we regulate, but the fact that 17 workers tragically died in other offshore related travel incidents in the year is a stark reminder that hazards are ever present offshore.

Although the overall numbers of injury and dangerous occurrences are comparatively low, considering a workforce of almost 27,000 and the numbers of rigs and the continuous operations undertaken, this does not excuse the fact that the fatal and major injury rate has almost doubled. This year's overall health and safety picture is simply not good enough. The industry has shown it can do better and it must do in future.

I am particularly disappointed, and concerned, that major and significant hydrocarbon releases are up by more than a third on last year. This is a key indicator of how well the offshore industry is managing its major accident potential, and it really must up its game to identify and rectify the root causes of such events.

We will continue to take a tough line on companies who put their workers at risk. The challenge to improve safety will be ever greater as more offshore installations exceed their original design life. Our new inspection initiative will check safety management plans to ensure ageing is being taken into account, but the responsibility for getting safety right in the first place rests where it always has - with the duty holders.⁶²

On 7 December 2010 the BBC Today programme also reported that an internal safety review from Transocean on Shell's Sedco 711 platform narrowly avoided an incident similar to *Deepwater Horizon* on 23 December 2009. On that day a blowout occurred, again similar to *Deepwater Horizon*, as the crew was preparing to switch from a drilling operation to production. Today reported that key indicators that something was going badly wrong were either misinterpreted or discounted—in this case in favour of a positive pressure test from a valve at the base of the well. The report stated that by the time the crew realised there was a problem oil and gas from the reservoir was already forcing its way up the drill shaft and out onto the rig and there was not enough heavy mud available to pump back down into the well, and to counteract the surge. However, unlike *Deepwater Horizon*, a major spill was averted when the blowout preventer was activated, capping-off the well on the sea floor.⁶³

⁶² Health and Safety Executive, 24 August 2010: <http://www.hse.gov.uk/press/2010/hse-offshorestats.htm>.

⁶³ Today Programme, 7 December 2010: http://www.bbc.co.uk/blogs/today/tomfeilden/2010/12/a_near_miss_for_the_north_sea.html.

