

**RULE 26 REBUTTAL REPORT ON BP'S DEEPWATER HORIZON
MACONDO BLOWOUT**

**RE: OIL SPILL by the OIL RIG
"DEEPWATER HORIZON"
GULF OF MEXICO
APRIL 20, 2010**

**PHASE 2 EXPERT REBUTTAL REPORT
SOURCE CONTROL**

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**Prepared for:
The Plaintiff Steering Committee (PSC) for MDL No. 2179**

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF LOUISIANA
THE HONORABLE JUDGE BARBIER
MAG. JUDGE SHUSHAN**

**By order of
The Judicial Panel on Multi District Litigation**

June 10, 2013

I was asked to review the reports of Messrs. Burch, Carden, Gibson, and Adams for BP as they addressed BP's Process Safety Management system. After considering the opinions stated, I offer the following report:¹

[REDACTED]

¹ I have rebutted only some of the statements and opinions with which I do not agree. By not responding to or rebutting other statements, I am not adopting them. Rather, I have decided only to rebut those issues that materially misstate my report and/or the opinions I reach in that report. Further, as stated in my Phase 2 report, because the Court already admitted my Phase 1 report in the Phase 1 trial, which includes my background and many of the underlying principles discussed in my Phase 2 report, I did not include them again in my Phase 2 report, nor do I include them in this rebuttal even though BP's expert witnesses criticize me for not fully explaining the principles on which my opinions rely.

² Phase 2 Report Of Morris Burch, May 10, 2013

[REDACTED]

As was the case in Phase 1, BP ignored properly preparing for post blowout source control because they thought they *could-get-away-with-it*, and failed to make meaningful proactive provisions to either determine plans and processes for intervening in a deepwater blowout or to have adequate well control equipment staged and ready to rapidly deploy in the event of loss of well control and an ensuing blowout.

Complicated systems fail in complex ways.⁴ This is not only true for *operating systems*, such as the Deepwater Horizon drilling rig, but also for *contingency systems*, such as the BP Macondo well 'we will think about it after it happens' emergency response and preparedness system. Anticipating and preparing for failures ahead of time, or

³ *Normalization of Deviance* is a term used by process and system safety specialists to describe and characterize a departure from safety-critical standards due to an erosion of safety management requirements resulting from repeated "getting-away-with-it" actions that marginalize the true underlying risk. Normalization of Deviance has been identified as the underlying cause of many well known catastrophes such as the Challenger and Columbia Space Shuttle disasters.

⁴ Bea, Robert G., "Understanding the Macondo Well Failures," Deepwater Horizon Study Group Whitepaper, January, 2011; also see Bea, Robert G., "Learning from Failures: *Painful Lessons from the Recent History of Failures of Engineered Systems*" U.C. Berkeley, Center for Catastrophic Risk Management, Jan., 22, 2006: "**Impossible failures** -- Most failures involved never to be exactly repeated sequences of events and multiple breakdowns or malfunctions in the components that comprise a system. Failures resulted from breaching multiple defenses that were put in place to prevent the failures. These events are frequently dubbed incredible or impossible. After many of these failures, it was observed that if only one of the barriers had not been breached, then the accident or failure would not have occurred. Experience adequately showed that it was extremely difficult, if not impossible, to recreate accurately the time sequence of the event that actually took place during the period leading to the failure. Unknowable complexities generally pervade this process because detailed information on the failure development is not available, is withheld, or is distorted by memory. Hindsight and conformational biases are common as are distorted recollections...."

preparing for *predictable surprises*,⁵ is the underpinning of Process Safety Management and emergency planning. As described in my Phase 2 expert report, BP did not have a well thought out and preplanned source control contingency other than to gather its experts to figure out what to do while they commenced drilling a relief well – which could take 100 to 150 days to complete. BP’s initial attempts to gain control of the well, such as [REDACTED] the Top Kill, were a series of ad hoc failures due to a lack of planning and foresigh [REDACTED]

[REDACTED] In the case of Macondo, it was a known high-risk endeavor with foreseeable failure consequences. BP’s failure to be adequately prepared for source control must indeed be viewed as **inexcusable** given the particulars in this incident- especially when coupled with its history of Process Safety Management failures.

[REDACTED]

[REDACTED] As I have stated, it is my opinion, based on Process Safety Management risk ALARP requirements, that BP should have had fit-for-purpose post blowout source control mitigation measures to ensure the consequences of a deepwater blowout were As Low As Reasonably Practicable. Although I have said that mitigation controls, such as capping stacks, were feasible and fit-for-purpose prior to April 20, my opinion should not be misconstrued, [REDACTED] by suggesting it is solely limited to the provision of capping stacks. To be clear, my

⁵ Max Bazerman and Michael Watkins, *Predictable Surprises – The Disasters You Should Have Seen Coming And How To Prevent Them*, Harvard Business School Press, 2004.

opinion is that BP should have had proper mitigation controls and had them developed, tested and available, prior to the incident as an in-place Process Safety Management response barrier. Instead, BP had an Oil Spill Response Plan that was not a source control plan and a Well Control Response Guideline that contemplated Remote Operated Vehicle (ROV) Blowout Preventer intervention and a relief well – each of which alone, and taken together, were not fit-for-purpose. [REDACTED]

[REDACTED]

[REDACTED] ⁷ The Oil Spill Response Plan, as multiple BP witnesses testified, was not intended by BP to be a source control plan. Thus, it was not and could not serve as a mitigation barrier plan for source control. ROV intervention also was addressed in detail in my report, and it is my opinion that ROV intervention, while an appropriate prevention measure, cannot serve as a mitigation barrier as it is known to be largely ineffective once a deepwater well has blown out.⁸

Relief wells have been shown to be effective at stopping the source of a spill, but they take a long time to drill (typically 100-150 days, but as long as 10 months in Ixtoc I), and therefore are not fit-for-purpose in the case of a deepwater blowout that could potentially flow, as BP anticipated, at 162,000 barrels per day. As the primary goal of Process Safety Management, “the purpose” under consideration is to mitigate the spill by stopping the release as quickly as possible to prevent a major environmental catastrophe.

Accordingly, BP failed to operate the Macondo exploratory well system in a state where risks were managed to an As Low As Reasonably Practicable condition. In fact, BP

⁶Bea Expert Report, Phase 2, at pp 26-33.

⁷ *Id.*

⁸ TREX 3624; TREX 3174; TREX 7353; TREX 4423; West Engineering Services, Inc., *Evaluation of Secondary Intervention Methods in Well Control*, U.S. Minerals Management Service Solicitation 1435-01-01-RP-31174, March, 2003 at 66; Phase 2 Expert Report of Gregg Perkin; Deposition Testimony of James Wells at 192-193; Deposition Testimony of Pat Campbell at 163-167; Deposition Testimony of Charles Holt at 49-56; Deposition Testimony of Harry Thierens at 30-32, 197-198, 464-467, 662-672, 682-684, 686-689; Deposition Testimony of David Barnett at 200-204; Deposition Testimony of Andrew Inglis at 136-137, 139-142, 145-146; Deposition Testimony of Geoff Boughton at 442-443.

simply ignored the risks because they felt it was not worthwhile to invest the time and money warranted to proactively address it in a proper manner.

[REDACTED]
[REDACTED] In support, he points to BP's Drilling and Well Operations Practice, the Gulf of Mexico Hazards Risk Management Policy, BP's Beyond the Best Common Process Handbook, and BP's Deepwater Well Control Guidelines as examples of BP's risk management practices. However, not one of these documents addresses with any specificity the actions that should be taken in the face of an uncontrolled deepwater blowout other than drilling a relief well and implementing the Oil Spill Response Plan. In fact, these policies, rather than shielding BP from its obligation to undertake further source control measures prior to April [REDACTED] illustrate why BP was obligated to do more to ensure they were prepared to deal with a blowout in a HPHT well.

With regard to applying Process Safety Management ALARP, BP's own policies required it to manage all risks "to a level which is as low as reasonably practicable."⁹ In fact, the Drilling and Wells Operations Practice requires that "for all exploration, HPHT, and H₂S appraisal wells a well specific Well Control Response Guide shall be prepared."¹⁰ I have been unable to find any well specific Well Control Response Guide for the Macondo Well, and plaintiffs' counsel has informed me that they did not find such a document in the documents BP produced in this litigation. Furthermore, none of the BP experts cites to such a Guide, leading me to the conclusion that, in violation of BP's own policies, it does not exist. This is yet another example of "Normalization of Deviance," and is symptomatic of an organization with a dysfunctional Process Safety Management culture.

[REDACTED]
[REDACTED] BP's Well Control Response Guide, the Gulf of Mexico Regional Oil Spill Response Plan, and BP's Crisis and Continuity Management Plan. I have reviewed each of these plans and continue to hold the opinion that these plans did not and could not serve as appropriate mitigation measures in the event of an uncontrolled blowout. In short, these plans provide emergency responders with no actual plans on how to implement intervention techniques. The plans merely call for organizing a response and provide responsibility guidelines and limited decision tree examples. As far as providing guidance on appropriate intervention techniques, the plans [REDACTED] provide nothing.

⁹TREX 93 (DWOP).

¹⁰ *Id.*

BP's Well Control Response Guide limits itself to the first 48 hours of the event: "This manual provides a working methodology to safely and effectively manage an initial response to a well control incident. This would normally cover the first 48 hours until dedicated control and recovery teams are formed and well control specialists are on location."¹¹

The Guide then goes on to admit that BP was not prepared to respond to an event like Macondo. In the section of the Guide discussing Source Control Consideration for the Incident Commander, the Guide states that "[m]ajor oil spills in conjunction with a well blowout are rare so there has not been the same effort in adapting the current oil spill plan to effectively managing a well blowout which may or may not have a spill involved."¹² In short, BP knew and acknowledged it was not prepared to handle such an event.

Moreover, BP failed in a key element of Process Safety Management with regards to training its responders to handle a deepwater blowout scenario. The BP personnel who were deployed to work on the response admitted they had no training in deepwater well control. For example, James Wellings, a member of BP's source control team, stated that he had no well control training that addressed the type of situation presented by Macondo; that the extent of his training dealt with shutting in the BOP and removing the influx safely.¹³ Andrew Frazelle, also a member of the source control team, explained that the well control training BP offered related to prevention "versus the reactionary side of things."¹⁴ And, Richard Harland, who was BP's Source Control Chief for the Deepwater Horizon response, testified that he did not have any training in how to contain a blowout in deepwater other than utilizing the BOP to shut in the well.¹⁵

[REDACTED] BP has freely admitted that the Oil Spill Response Plan was not designed as a source control plan. As BP's designated 30(b)(6) witness, Earnest Bush, testified regarding the Oil Spill Response Plan, "The Plan is not - not about Source Control. This Plan is about how to respond to an oil spill on the surface. This portion of the Plan [Section 6(c)] is trying to understand, at what point, does the Oil Spill Plan come into play."¹⁶ Given that BP itself has written and testified

¹¹ TREC 2520; 7352.

¹²*Id.*

¹³ Deposition Testimony of James Wellings at 82-83.

¹⁴ Deposition Testimony of Andrew Frazelle at 219-220.

¹⁵ Deposition Testimony of Richard Harland at 119-122.

¹⁶ Deposition Testimony of Earnest Bush at 17.

that the Oil Spill Response Plan was not intended to act as a source control measure, it cannot be cited as an appropriate source control mitigation barrier.

██████████ BP's Crisis and Continuity Management Plan as a response plan. However, this Plan, like the other plans cited, contains no intervention techniques that could be used in the face of a deepwater blowout. One of the primary objectives of this Plan was to "interface with external BP groups to protect [BP's] reputation, financial integrity, and license to operate."¹⁷ This is not a source control plan.

In short, no expert for BP is able to identify a single document that shows BP had a plan for the use of any appropriate mitigation controls designed to comply with 30 CFR 254.5 and the requirement BP had to "immediately abate the source of a spill" The regulator expected BP would have the equipment and methods to intervene and stop an uncontrolled deepwater blowout.¹⁸ BP did not meet that expectation.¹⁹

Multiple BP executives have testified that BP management elected to focus on prevention rather than allocation of resources for appropriate mitigation controls and BP acted in accordance with these policies. ██████████

██████████ BP Management's policy stated that risks could be "acceptable because they are too expensive to mitigate or eliminate."²⁰ BP's version of ALARP appears to be one largely of convenience and costs saving, rather than a matter of Process Safety Management.

In the case of the Macondo well, BP acted in accordance with its Risk Management Plan; its stated policy was to attempt to eliminate the risk or reduce the probability of occurrence "rather than to mitigate the consequences should it happen." However, their prevention efforts were sadly lacking and fell short of this goal as discussed in my Phase 1 expert report.²¹ BP's 2009 Gulf of Mexico SPU Major Hazard Risk Register itself states that the contingency for a Loss of Well Control on the Deepwater Horizon was the "BOP stack with redundant systems." As I explain in my report, the Blow Out Preventer is a *prevention* measure, not a mitigation measure.²² In the case of the Macondo well, BP followed that policy by electing to rely upon prevention measures and not to implement fit-for-purpose source control mitigation barriers (relief wells do not meet this requirement).

¹⁷BP-HZN-2179MDL02300770 at BP-HZN-2179MDL02300772.

¹⁸ Deposition Testimony of Lars Herbst at 410-411.

¹⁹ *Id.* at 348.

²⁰BP-HZN-2179MDL01334280 at BP-HZN-2179MDL01334291

²¹ TREX 20001.

²²Bea Expert Report, Phase 2, at pp 30-31.

[REDACTED]

My opinion is simply that an appropriate mitigation measure, designed to “immediately abate the source” was required to bring BP’s Macondo System within the parameters of its Process Safety Management obligations. I agree a capping stack could have accomplished that purpose; however, I am not limiting my opinion solely to a capping stack. Process safety management required BP to perform such an evaluation before April 20 and to determine whether a capping stack, or some other equipment (e.g. BOP placed on top of failed BOP), was the appropriate source control mitigation measure. They did not meet this obligation.

[REDACTED]

BP itself described deepwater drilling as similar to exploring outer space.²³ Tony Hayward described a deepwater blowout as “one of the highest risks for the corporation. It was the highest risk in the Gulf of Mexico and one of the highest risks for the Exploration and Production Unit.”²⁴ BP’s Major Hazard Risk Register quantified the Loss of Well Control with the Deepwater Horizon as a C4 risk.²⁵ A *Level C* severity is considered to be a Major Hazard Risk and a *Level 4* probability identifies the risk at 1×10^{-4} to 1×10^{-3} per year. BP’s Major Accident Risk Process identified a risk of 1.7×10^{-3} per year.²⁶ [REDACTED]

²³Deposition Testimony of Tony Hayward (“Hayward Depo”) at 863-864; Wetherbee at 38-40; TREX 23.

²⁴ See Hayward Depo at 196.

²⁵ BP-HZN-2179MDL00337271.

²⁶ BP-HZN-2179MDL00407937

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] There is no evidence that BP even considered how to conduct a source control operation in deepwater, much less continued to improve its Process Safety Management system.

Insofar as the opinions of Messrs. Carden, Adams and Gibson, I offer the following observations:

In Mr. Carden's opinion, "BP was prudently prepared for a deepwater blowout, including the *Deepwater Horizon* blowout, prior to April 20, 2010. He believes BP met the industry standards and practices in preparing for a deepwater blowout." In support of this contention, Mr. Carden cites to the OSRP in place and claims that "BP staff was trained on how to respond to a blowout." However, it is clear that the OSRP only addressed surface oil spill control and had no meaningful preplanned source control contingencies or resources to quickly bring to bear when needed. Moreover, as already discussed, the testimony plainly refutes his contention with regard to personnel training. Mr. Carden's opinions have no basis in fact and cannot be believed. One can only conclude from Mr. Carden's report that BP was not prepared to effectively respond to a deepwater blowout, and that, because of this gross oversight in Process Safety Management, BP -- the largest producer of oil and gas in the northern Gulf of Mexico -- was not at fault and cannot be held accountable because the MMS approved their paperwork. I strongly disagree with this notion.

Mr. Adams thinks that BP used “sound engineering judgment” and “enabled the Unified Command to secure the well as expeditiously as practicable.” I would add that Mr. Adams is overlooking the circumstances and particulars under which the well was *expeditiously secured*. If BP had used sound engineering judgment, they would have preplanned what to do in the event of a deepwater blowout and have had the equipment and resources in place for rapid deployment. Here again, the record clearly refutes Mr. Adams opinions.

Moreover Mr. Adam states that “Contrary to the reports by Mr. Gregg Perkin and Dr. Robert Bea, it cannot be said with any degree of engineering certainty that the well could have been shut in ‘within weeks’ of the blowout, in a manner that minimized risk to the environment, even if BP had access to a capping stack prior to April 20, 2010.” I would point out that Mr. Adam’s opinion is contradicted by BP’s third party well control experts, like Cameron and others, who made the the observation based on their own hands-on experience that the well could have been shut in within weeks had BP planned for such an event.²⁷

Finally, with regard to Mr. Gibson’s findings, I note that he is critical of my Phase 2 report because it “does not contain any assessment of how BP applied Process Safety Management procedures during the multitude of activities that occurred during the months of Source Control planning and operations following the Incident of April 20, 2010. In addition, Dr. Bea’s report does not contain any assessment of how BP applied Process Safety Management procedures to the risk involving subsea broach, one of the most important decisions influencing Source Control management.”

My report is not about what BP did after the event occurred in a desperate effort to avoid the consequences of its bad decisions, but rather it is about what they should have done before the blowout to be properly prepared to handle it and minimize its consequences. And, quite simply, they ought to have put in place a post blowout source control plan and supported it with the needed resources, equipment, and personnel training as is NOW being done in the GOM, and as should have been done before Macondo, regardless of what BP thought it could get away with (or without) doing before April 20, 2010. The need for ensuring process safety and risk management has not changed with the Spill...it has only become more obvious to those who should have known beforehand.

²⁷ Deposition of David McWhorter at 452; 474.

The opinions in this Rebuttal Report are mine alone.²⁸ Each of the opinions I express herein are based upon my experience, education, training, and expertise. I have not been asked to make any assumptions, nor have I presumed any facts, beyond those evidenced by and from the reliance materials identified in my Phase 1 Expert Report of August 26, 2011, in the reliance materials identified in my Phase 2 Expert Report of April 5, 2013, and the sources and information considered cited herein.

Signed this 10th day of June 2013.

A handwritten signature in black ink, appearing to read "R. G. Bea", written in a cursive style.

Dr. Robert G. Bea, Ph.D.

²⁸ In my preparation of this report, I consulted with Dr. William E. Gale, Jr. I did not rely on Dr. Gale, however, for the opinions express herein.