



# An Industry Stress Test for Deepwater Drilling and Exploration Companies?

Emery Roe<sup>1</sup>

---

## Abstract

An industry-wide stress test is proposed for the deepwater drilling and exploration sector along the lines of the banking-sector stress test of major holding companies and investment firms undertaken after the 2008 financial meltdown. As part of the proposed test, major drilling and exploration companies would have to demonstrate conformity to industry better practices when it comes to risk assessment and management and other key decision-making processes. Failure to do so could lead to remedial regulatory measures, ranging from temporary decertification of the deepwater driller to indefinite reimposition of an industry-wide moratorium on deepwater drilling.<sup>2</sup>

---

---

<sup>1</sup> Center for Catastrophic Risk Management, University of California, Berkeley.

<sup>2</sup> Although they might not see it, I have profited from DHSG discussions, papers or emails of Paul Schulman, Bob Bea, Karlene Roberts, David Pritchard, Wayne Needoba, Earl Carnes, Yngvar Duesund, Andrew Hopkins, and Jon Espen Skogladen. The errors are mine.

## 1. Introduction

On October 7, 2010, and as part of the Joint United States Coast Guard/Bureau of Ocean Energy Management Investigation on Deepwater Horizon, an interchange occurred between Mr. Jason Mathews, an Investigation Board member, and Mr. Gregory Walz, leader of BP's drilling engineering team for exploration and appraisal who had been supporting Deepwater Horizon operations at the time of the blowout.

The testimony has the imperfections of real speech, but is illuminating and helps frame the stress test proposed in this white paper.

Mr. Mathews: . . . I would like to know how you feel that if these people [BP leadership team] have to manage a safe and reliable operation when BP imposes a performance measure on them, that their personnel — that they reduce costs and cost savings?

Mr. Walz: Sir, as long as I have been in the industry, I mean, there's always — priorities always come down to safety, environmental, the resource, and then you talk about costs.

You don't cross the line between safety and environmental. All your discussions that you're having around costs, risk evaluations there, is relative to how large is this reservoir, can we make money or it's around that. It's not — You don't cross the line of going into safety and environmental by cutting costs.

Mr. Mathews: As an employee of BP, do you feel comfortable that you have a performance measure that requires people to reduce costs and cost savings at any level within the operation?

Mr. Walz: Not at any level. You don't cross safety and environmental.

Mr. Mathews: . . . Do you feel that a prudent operator would require their employees in a performance measurement to reduce costs on a rig and basically, according to their own documents, meet weekly to figure ways to reduce costs?

Mr. Walz: We are a business.

Mr. Mathews: I understand that.

Mr. Walz: And it's from that relationship as far as from a business, but you don't cross the line with safety and environmental.

Mr. Mathews: And how do you ensure that?

Mr. Walz: You rely on your people, and as you start working through any of the cost reductions, if the safety, environmental issue is identified, then you validate is it there or not, and then you make the appropriate judgment.<sup>3</sup>

---

<sup>3</sup> Deepwater Horizon Joint Investigation Transcript. "Testimony of The Joint United States Coast Guard/Bureau of Ocean Energy Management Investigation. October 7, 2010, AM Session." USCG/BOEM Board of Investigation (Re. Deepwater Horizon), 176-178.  
<http://www.deepwaterinvestigation.com/external/content/document/3043/925807/1/InvestigationAM100710Full.pdf>

Let's start with the fact that BP is a business. Let us assume that, as Mr. Walz describes, BP cost reductions are worked through, safety and reliability issues (if any) are then identified and validated with respect to those proposed cost reductions, and thereafter an appropriate judgment is made in light of the preceding analysis. For short-hand purposes, let us call making decisions on safety and reliability this way a form of "risk assessment and management" (RAM). Finally, assume versions of this RAM are what happen more or less across major companies in the drilling and exploration industry.

The question is: Is this way of making decisions itself safe and reliable? Do these RAMs actually reduce the probability and consequences of major drilling failures? Would drilling and exploration companies be able to pass an industry-wide stress test to assess their decision-making capacities to prevent disasters?

The industry-wide stress test proposed here would be analogous in important respects to the one that major banks and investment firms had to pass after the 2008 financial meltdown.

## **2. Treasury Stress Test of Major Financial Institutions**

Between the end of February and late April 2009, nineteen of the largest bank holding companies, accounting for two-thirds of the assets and more than one-half of the loans in the U.S. banking system, were required to undergo a U.S. Treasury stress test to ensure the companies had appropriate capital reserves on hand in case the economy worsen.

According to information available online, more than 150 personnel from the Federal Reserve, Office of the Comptroller of the Currency, and Federal Deposit Insurance Corporation were involved in the stress testing. Based on two economic scenarios—one a consensus estimate by forecasters of "business as usual" and the other, an economic scenario more severe than generally anticipated—the testers developed a range of loss estimates and conducted in-depth reviews of the banks' lending and investment portfolios, trading exposures, and revenue opportunities.

The stress testers are reported to have inspected bank data and loss projections, analyzed the projections across firms, and developed independent benchmarks against which to evaluate bank figures and estimates. From the analyses, supervisors identified capital buffers to ensure that the firms would remain appropriately capitalized if the economy were weaker than expected.

The results of the Treasury stress tests were announced in early May 2009 and are generally recognized to have contributed to restoring a modicum of confidence to an otherwise hammered financial sector. Later, European authorities undertook stress testing of their own in light of the U.S. confidence building success.

I suggest here that a parallel stress test can be undertaken in the deepwater drilling and exploration sector.

Just as the financial stress test did not start at the branch bank level but was focused from the outset at the company level and intended to be industry-wide, so too would the deepwater drilling stress test not be solely at the level of the individual drilling rig or crew or exploration site.

Instead, the proposed stress test would also be company and industry wide and focus on BP, Shell, Chevron, and Exxon Mobil—that is, those companies that reflect the bulk of revenue in deepwater drilling industry. The parallel goal would be to restore confidence in the deepwater drilling industry as an industry, especially as major deepwater drilling problems are said to exist across companies rather than isolated to BP only.

Finally, the question mark (“?”) in the title of this paper is deliberate. What follows is a proposal, based on an imperfect analogy, which would have to be fleshed out in greater detail to be of any real use.

### **3. An Illuminating Caveat**

In calling for a stress test of deepwater drilling and exploration that is analogous to the one for the financial sector, the assumption is that they involve similar crises of confidence. However, the crises differ in at least one instructive way.

At the time of its collapse the American Insurance Group (AIG) was an organization of more than 4,300 legal entities with 116,000 employees and operations in 130 countries across the world. The company’s unraveling started with merely one of those entities, a 377-person unit in London that had packaged wildly destructive credit default swaps.

In brief, this AIG subunit, as well as that BP contracted rig, took actions that led to massive financial losses for both companies. But therein is the rub: AIG would have collapsed as a company without its federal bailout; BP didn’t require a federal bailout at all. Which one, as such, looks to be the more resilient?

What then is the use of a stress test for a deepwater drilling and exploration sector that seems *post facto* to be highly resilient—perhaps *too* resilient? Consider another comparison. Yes, the May 10, 2010, flash crash of U.S. stock markets did incur huge costs, but markets recovered fairly rapidly along with some changes in regulations affecting high frequency trading. Yes, Deepwater Horizon did incur huge costs, but so too is BP recovering along with some changes in regulations affecting the deepwater drilling industry. In fact, the deepwater drilling industry has scarcely faltered, at least when compared to the financial sector since 2008.

The crux however—and this is where this paper’s analogy holds—is that risk assessment and management practices in both the financial and the deepwater drilling *industries* have been and remain a great cause for concern. As David Pritchard and his colleagues put it:

So, what is the problem? We often hear that “the industry has drilled 35,000 wells in the Gulf of Mexico,” implying that no real problem exists. The metrics do not support that statement and demonstrate that only forty-three (43) [complex wells having the Mechanical Risk Index of 3, 4, and 5] have been drilled through year-end 2009. So what is the real risk of occurrence of catastrophic failure relative to the BP Macondo [based on the data]: Is it 1/35,000 or is it now 1/43? <sup>4</sup>

---

<sup>4</sup> See: Targeting Problematic Deepwater Operations, working paper for the DHSG, Pritchard, Kotow September 2010 (material also covered in Deepwater Well Complexity: The New Domain, working paper for the DHSG, Pritchard, Lacy, and Kotow, September 2010, and The New Domain in Deepwater Drilling: Applied Engineering and Organizational

The question, thus, becomes:

*What are the industry-wide better practices followed in the drilling of these 43 wells? Are there better practices that have evolved since the advent of deepwater drilling for the industry as a whole? If so, are they matched by changes in regulations to ensure best practice is followed?*

*In particular: Is the decision-making process outlined by BP's Mr. Walz at the start of this white paper actually better practice and one followed in drilling the 43 deepwater wells and one to be encouraged by regulation?*

Answering these core questions would require drilling companies to demonstrate that the kind of best practices and competency measures identified in other DHSG white papers (e.g., Pritchard et al; Skogdalen; Duesund and Gudmested) were followed in the drilling of the 43 wells or, barring that, are being followed now or will be in the post-moratorium world of deepwater drilling.

Note that this version of the stress test—does the drilling industry have the practices for better decision-making and the resources to back them up—is not all that far off from what the financial stress test was really all about, namely, ensuring appropriate resources (“capital on hand”) for better financial risk assessment and management practices under worsening conditions.

## 4. Some Specifics

Following a recommendation by Bob Bea, we can imagine two basic scenarios for stress testing of the drilling industry as an industry: Specifically, do the major drilling companies have sufficient practices and resources to:

Scenario 1) prevent a blowout during an exploratory drilling project in ultra deep water – something like but perhaps different in important respects from the Deepwater Horizon scenario.

Scenario 2) prevent a fire and explosion during production operations on an ultra deepwater platform – something like but perhaps different in important respects than the Atlantis scenario.

In light of the preceding analysis, the policy and management priority of the industry stress test would be to document such assurances for the 43 complex deepwater wells already in place.

More specifically, the objective of the industry stress test is to ensure a company's deepwater drilling and production practices conform to existing regulation and are equal to or better than industry better practices.<sup>5</sup> How would this work?

---

Impacts on Uncertainties and Risk for the DHSG, Pritchard and Kotow, October 2010). The Mechanical Risk Index is an algorithm developed and owned by the James K. Dodson Company.

<sup>5</sup> I avoid the term, “best practice,” since a number of “best practices” in policy and management confuse what may have work well in a single case (at one site, in two labs, via thousands of Monte Carlo simulations) for those better practices that emerge and are improved across multiple and real-world cases.

Assume that existing regulation provides a base level of prevention. There is no reason to believe that this base level is sufficient or necessary to ensure prevention. We can and must expect official regulation to lag behind unofficial practice as the latter improves, in light of learning and training, across an industry.

Imagine then a two-by-two table, with one dimension for whether the existing industry regulation is being followed or not and the other dimension for whether better industry practice is being followed or not,

		<b>Better Practices</b>	
		<i>Followed</i>	<i>Not Followed</i>
<b>Existing Regulation</b>	<i>Followed</i>	BEST	WORSE
	<i>Not Followed</i>	BETTER	WORST

Deepwater drilling that conforms to both the law and better practice is, other things being equal, the *best* situation to be in when it comes to acceptability and desirability—at least when compared to those *worst* drilling situations that conform neither to existing law or better practice. Were the best not happening, it would be *better* to be in situations where practice is improving when regulations are out-of-date. *Worse* would be following the regulation that falls short of available better practice. All in all, the optimal regulation would be one that enables better practice to be developed and adopted industry wide.<sup>6</sup>

Within this framework, the objective of the proposed stress test would be for each drilling company to demonstrate it is in the BEST cell when it comes to their drilling and exploration practices, including but not limited to the 43 complex deepwater wells. The practices in question would be those identified by Pritchard and others in their DHSG white papers but not limited to them. Of special concern is stress testing those practices that govern a company’s decision-making processes governing risk assessment and management, both on the rigs and in the headquarters.

Specifically, does the company’s version of RAM—on paper and in practice—conform to industry better practices in risk assessment and management?<sup>7</sup>

In answering the question, the stress testing would focus on actual and projected company costs in deepwater drilling, relying on company-specific information about the risk characteristics of its drilling portfolio, underwriting practices, and cost reduction strategies, as well as risk management practices governing “appropriate judgment” in Mr. Walz’s terms.

Since this is an industry stress test, the teams of assessors would ensure that such analyses are applied across companies and that company results are rated against industry better practices. *In*

---

<sup>6</sup> There are doubtless industries where the real-world application of government regulation is better than any company “best practices.” My reading of the DHSG archived material and email correspondence leads me to believe that some practices and procedures used by drilling and exploration companies are better than the pertaining regulations.

<sup>7</sup> See the DHSG working paper by Roberts on the gap between BP’s past professions of safety as a priority versus its contemporaneous reality.

*addition*, stress testing for different rigs, crews and sites would be necessary and undertaken in parallel with headquarters stress testing, the former topic being addressed by other DHSG white papers.<sup>8</sup>

None of this will of course be easy and raises the obvious issue: What government agency would undertake the stress testing? I do not know.

Neither the failed Minerals Management Service (MMS) nor its reincarnated U.S. Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) has a reputation in as high a regard as that of the Treasury or Federal Reserve in the financial sector. Equally important, the regulator's governing legislation may have to be amended to ensure industry stress testing as part of the regulator's supervisory powers.<sup>9</sup> If BOEMRE were the tester, then some assessors may have to be contracted, as BOEMRE inspectors are typically used on-site for supervision of actual drilling and exploration—which is only part of the proposed industry stress test.

Most important, the drilling companies would be required to open their books as part of the supervisory process mandated by regulation and recognize that test results could determine that some or all of the companies have to augment their resources and practices to prevent the major scenario disasters. Failure to make augmentations could lead to remedial measures by the regulator undertaking the stress testing, ranging from temporary decertification of the deepwater driller to indefinite reimposition of an industry-wide moratorium on deepwater drilling. As with the financial stress test, company-specific information would remain confidential as part of the supervisory process of the regulator(s) concerned.

---

<sup>8</sup> These site-specific (rig-specific, crew-specific) components of the industry stress testing require more attention than I can give, especially with respect to the vexed intersection of corporate RAM strategies and what actually happens in the field by way of “risk assessment and management,” case by case. From the perspective of high reliability management, a company practice of trading off reliability against cost, rather than treating reliability as non-fungible if failure is to be prevented, must be of grave concern. (For a HRM perspective on the Deepwater Horizon Spill, see the Roe and Schulman working paper prepared for the DHSG; A High Reliability Management Perspective on the Deepwater Horizon Spill, Including Research Implications.)

<sup>9</sup> *Ideally*, the regulator would have the authority to set regulations with respect to, inter alia: balance requirements in the bore well (between, for example, upward pressure from the reservoir and downward pressure from the top of the well); bandwidths and variances, if any, around these requirements (e.g., drilling margins and “kick tolerances”); and better practices for different drilling performance modes (e.g., better drilling practices that are just-in-case something goes wrong as distinct from better just-in-time practices when something has gone wrong). I thank Paul Schulman for thinking through what we are calling “regulatory reliability.”