

The Offshore Oil and Gas Industry
Report in Insurance – Part Two

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Booz | Allen | Hamilton

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INTRODUCTION

Booz Allen was tasked to research the following questions pertaining to how operators and drillers (i.e., those engaged in exploration and production (“E&P”) activities) insure their assets, equipment, workers, and potential business losses in the event of a disaster, such as an oil spill.

The following two questions were addressed in Part One of our report:

- a) How do insurance companies insure firms engaged in E&P operations?
- b) What are the different kinds of insurance policies available to operators and drillers?

The following six questions, identified below, are addressed in this report:

- c) Is there an actuarial component to insuring E&P operations?
- d) Where and how do insurers get their data?
- e) What role does Lloyd’s Registry play?
- f) Are audits performed on firms engaged in E&P activity? If so, are they conducted by an independent third-party?
- g) Does the operator or the drilling company have final say over safety procedures on the drilling rig?
- h) What do insurers consider to be the largest risks associated with firms engaged in E&P operations?

The remaining five questions, identified below, will be addressed in a subsequent report:

- i) How does insuring in this industry compare to insuring in other industries (e.g. the nuclear industry)?
- j) How do the factors that insurance companies use to evaluate risk differ from factors regulators use to evaluate risk?
- k) Will companies make changes on their own to reduce risk and secure lower premiums?
- l) How does the cost of regulation differ for companies that self-insure versus companies that purchase insurance from a third-party?
- m) Do insurance companies penalize firms engaged in “state-of-the-art” exploratory drilling with higher premiums?

KEY FINDINGS

- In addition to insurance companies, the energy firms themselves are employing actuarial analyses to evaluate their risks. This information allows firms to hold stronger bargaining positions when negotiating policies with insurers.
- Insurers obtain their data from a wide variety of sources, including company data, publically available data, internally held data, and industry experts.
- Energy companies hire Lloyd’s Register, one of eleven members of the International Association of Classification Societies, to appraise their assets and operations, ensuring compliance with regulations, industry standards, and underwriting requirements.

- Drilling companies initiate safety audits, hiring third-party inspectors to assess safety practices on drilling rigs.

- According to an industry expert, the operator trumps the driller with regard to safety practices and procedures followed during drilling operations. However, accountability appears somewhat ambiguous.

- Insurers, and other stakeholders, are concerned that, although firms engaged in exploration and production (E&P) activities extensively document safety processes and procedures, the incentives to effectuate safe operations may not be in place. It is critical that investors perceive that companies engaged in low-occurrence but high-risk, high-consequence deepwater exploration have risk mitigation policies in place that truly reduce risk. Otherwise, investors will be unwilling to participate in the capital markets that generate the funds necessary to insure these operations.

Q: IS THERE AN ACTUARIAL COMPONENT TO INSURING OPERATORS, DRILLING COMPANIES, ETC.?

Actuarial science employs the use of mathematics, statistics, and computer programming to assess risk in the finance and insurance industries. Specifically, the insurance industry uses actuarial methods to assess risk by forecasting future losses. These analyses are widely used throughout the industry, including in the upstream activities. ¹

What perhaps is even more interesting is that energy firms themselves are employing actuarial analyses to evaluate their risks and hold stronger bargaining positions when negotiating policies with insurers. The firms in the energy industry, as insurance “buyers”, are no different in this regard than many firms that employ insurance as a means to manage risk. For example, Diamond Offshore Drilling, a leading deepwater drilling operator, uses actuarial methods to determine what its liability is if a catastrophic event occurs that adversely affects its employees.² Specifically, Diamond uses the actuarial analysis to predict the amount of money it would expend to its employees (i.e. vessel operators, marine employers, etc.), or the families of the employees, if a work related injury or death would occur.

¹ Willis, Energy Market Review, March 2010 – “From an energy insurance standpoint, actuarial techniques have increasingly been used since the late 1980’s by leading energy insurers...”

² Diamond Offshore Drilling – 10K, February 23, 2010 “deductible for liability coverage for personal injury claims, which primarily result from Jones Act liability in the Gulf of Mexico, are \$5.0 million per occurrence, with no aggregate deductible. The Jones Act is a federal law that permits seamen to seek compensation for certain injuries during the course of their employment on a vessel and governs the liability of vessel operators and marine employers for the work-related injury or death of an employee. We estimate our aggregate reserve for personal injury claims based on our historical losses and utilizing various actuarial models.”

<http://biz.yahoo.com/e/100223/do10-k.html>

In addition, “captive insurance firms,” which are subsidiaries of larger conglomerates that act as private insurers specifically for that conglomerate, will use actuarial methods much like a non-captive insurer.

Below is a sample actuarial methodology provided by Willis, a global insurance broker, which illustrates how a firm or insurer performs an actuarial analysis:³

1. Review the client’s historical loss frequency and severity data.
2. Re-evaluate the data ensuring that it reflects the client’s current operations. Take into account changes in asset values, revenues, oil and gas prices etc. This is to express historical losses in today’s terms to enable comparisons.
3. Where applicable, compare the client’s loss data with the loss data of other clients in the same industry sector.
4. Derive mathematical loss frequency and severity loss distributions, or “models.” These models should accurately reflect the client’s historical frequency and severity of losses, and the client’s future loss frequency and severity.
5. Run the models repeatedly, in effect forecasting the client’s losses for the next year multiple times to confirm results.
6. Summarize the results.

Many times insurers and firms will simply look at the frequency and intensity of historical losses and assume that the distribution of those losses will be indicative of future losses. However, an actuarial analysis bypasses this assumption by assigning a value to certain probabilities, thereby helping firms understand the probabilities and severity of future losses.

³ Willis, Energy Market Review, March 2010

Q: WHERE AND HOW DO INSURERS GET THEIR DATA?

To establish an accurate risk profile, insurers obtain both qualitative and quantitative information from numerous sources. While we have not fully identified what specific data insurers assess when evaluating the riskiness of a deepwater drilling operation, we have identified general sources insurers use. We have compiled the following list based on our research of publicly available sources and also from input from Booz Allen Hamilton employees with insurance industry expertise.

- ***Data obtained directly from the company seeking coverage.*** This includes reviewing a company's loss history, internal controls, safety procedures, and risk mitigation practices. Oftentimes, firms seeking coverage will engage in direct negotiations to discuss terms, conditions, exclusions, capacity, premiums, etc., with the underwriters who are insuring the company's risk.⁴ This is especially true for larger firms, which bring bargaining power to the table since they are likely to purchase a significant amount of insurance, at significant cost to them, to cover their assets. These firms have an incentive to disclose information directly to the broker and insurer so as not to assume any risk associated with exclusions.⁵
- ***Publically available data.*** Insurers review publically available data, ranging from published statistics to viewing online videos of events as they

⁴ The insured's broker will be present during these negotiations. The broker works on behalf of the insured, seeking to match the company's desired level of coverage with the best policy available.

⁵ As identified in Part I of our insurance report, the broker works on behalf of the company seeking coverage. The broker negotiates policy terms and conditions with prospective insurers to identify the best policy for his or her client.

occur.⁶ For example, insurers will use information available online regarding the Deepwater Horizon accident to gain a greater understanding of the technology available and processes to fight a lost well/prevent a loss.⁷

- **Proprietary databases.** Insurers maintain proprietary databases that hold data regarding all of the policies underwritten by the insurer. This information is used not only to assess a specific request but also to evaluate the diversification of the insurer's portfolio. For example, an insurer would not insure all rigs in the Gulf of Mexico, because doing so would concentrate much of the insurer's risk in a single geographic area. If a catastrophic event, such as a hurricane, occurred it would result in the insurer paying out more claims than it possibly could afford. Therefore, one data point insurers evaluate when deciding whether to issue a new policy is how the risk of the new asset(s) compares with the risk of the existing portfolio.

- **Internal Experts.** Insurance companies employ subject matter experts, such as engineers, to evaluate risk.⁸ Insurers may also employ individuals to underwrite policies who were previously employed in the industry they are underwriting.⁹

⁶ Marsh. The 100 Largest Losses 1972-2009: Large Property Damage Losses in the Hydrocarbon Industries. 2010. < <http://global.marsh.com/news/articles/largelosses/index.php>>

⁷ Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf>

⁸ Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf>

⁹ Milton, Ursula. Insurance: a sector that places a premium on experience. The Financial Times. 1 October 2010. <<http://www.ft.com/cms/s/0/99166d54-c0a1-11df-94f9-00144feab49a.html>>

- **Third-Party Experts.** Insurance companies also hire third-party experts to independently assess risk.¹⁰ This was stressed in a recent press release issued by Munich Reinsurance (Munich Re). Munich Re has proposed a number of solutions for increasing the capital available to oil companies engaged in offshore drilling to insure against its risks. Munich Re stated that the successfulness of a project critically depends on the use of independent engineering consultants to monitor and oversee a project's risk management throughout the project's lifecycle.¹¹

¹⁰ Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf<

¹¹ Munich Re Develops New Insurance Solution for Oil Catastrophes. 12 September 2010. <http://www.munichre.com/en/media_relations/press_releases/2010/2010_09_12_press_release.aspx>

Q: WHAT ROLE DOES LLOYD'S REGISTER PLAY?

Lloyd's Register, not to be confused with "Lloyd's of London,"¹² provides independent assessments to companies operating high-risk, capital intensive assets in the marine, energy, and transportation sectors. Lloyd's Register group assesses business processes and upholds the technical standards of design, manufacture, construction, maintenance, operation, and performance. It provides independent evaluations throughout the entire lifecycle of assets, from design, to a review of in-service assets and operations, to decommissioning.

With regard to the energy sector, Lloyd's Register provides technical consulting to companies engaged in all areas of the energy sector, including upstream, downstream, power, and manufacturing.¹³ Lloyd's appraises energy-related assets and equipment to ensure safety and compliance with appropriate national and international regulations, codes and standards. Lloyd's Register Energy Business assists in asset management,¹⁴ engineering consulting, ensuring compliance with required regulations,¹⁵ while meeting any of a client's specific requirements. In addition, Lloyd's Register certifies that energy firms' assets and operations comply with insurance requirements.

Lloyd's Register group advises numerous organizations, such as the International Association of Classification Societies (IACS), the International Maritime Organization (IMO), and International Organization for Standards (ISO)

¹² Lloyd's Register and Lloyd's of London are separate legal entities.

¹³ Lloyd's Register Group is comprised of three smaller companies: Lloyd's Register Energy, LRQA, and Lloyd's Register Marine. Lloyd's Register Energy was created in September of 2009.

¹⁴ "Asset management" can be characterized having their wide-range of engineers (mechanical, civil, structural, etc.) performing, Fitness for service, Life extension, Operational integrity and reliability, Pipeline integrity management, Project quality management, Reliability-based mechanical integrity, and risk studies.

¹⁵ For example, Lloyd's Register certifies that assets and operations are in conformance with international codes and practices, such as those promulgated by the American Society of Mechanical Engineers (ASME). It independently verifies that assets and materials were made to specification.

to help develop rules and regulations. Lloyd's also provides training services and publishes many of their findings.

The clients of Lloyd's Register are the energy companies themselves. For example, Lloyd's Register was commissioned by Transocean Ltd. to conduct safety and equipment audits of its Deepwater Horizon rig in addition to three more of its rigs located in the Gulf of Mexico just months before the oil spill.¹⁶ According to a New York Times article, the team of inspectors deployed to the four rigs found critical safety, equipment, and mechanical issues, including:¹⁷

- Key components, such as the blowout preventer rams and failsafe valves, had not been fully inspected since 2000, despite guidelines requiring inspection of the preventer every three to five years;
- Approximately 43 percent of the rig workers feared reprisals for expressing concerns or reporting problems, with approximately 54 percent of the Deepwater Horizon workers expressing this fear.
- The ballast system of the Deepwater Horizon rig displayed mechanical problems and that rig's mud pumps were in poor condition.

Lloyd's Register reviews over 350 drilling rigs annually. Services include auditing the existing asset and maintenance management organization, asset preventative maintenance programs, and assistance with selection, configuration

¹⁶ "Report Commissioned Before BP Oil Spill Highlights Problems Abroad Deepwater Horizon, Other Transocean Rigs." *NewsInferno*. 5 August 2010. < <http://www.newsinferno.com/archive/report-commissioned-before-bp-oil-spill-highlights-problems-aboard-deepwater-horizon-other-transocean-rigs/>>

¹⁷ "Workers on Doomed Rig Voiced Concern About Safety" *The New York Times*. 21 July 2010. <<http://www.nytimes.com/2010/07/22/us/22transocean.html>>. See also "Report Commissioned Before BP Oil Spill Highlights Problems Abroad Deepwater Horizon, Other Transocean Rigs." *NewsInferno*. 5 August 2010. < <http://www.newsinferno.com/archive/report-commissioned-before-bp-oil-spill-highlights-problems-aboard-deepwater-horizon-other-transocean-rigs/>>

and implementation of asset and maintenance management computerized systems.¹⁸

Lloyd's Register is one of eleven firms that are members of the International Association of Classification Societies. The American counterpart of Lloyd's Register is the American Bureau of Shipping (ABS). Similar to Lloyd's Register, ABS' services arose out of the shipping industry but now include developing standards of design, construction, and operation of offshore drilling units. ABS certifies that vessels and offshore units comply with statutory, industry, and underwriting requirements. ABS' clients are not limited to within the U.S.; ABS' surveys are recognized by more than 100 governments.¹⁹

¹⁸ Lloyd's Register Energy. <http://www.lrenergy.org/Assets_we_Serve/Drilling.aspx>

¹⁹ For more information, visit ABS' website at <http://www.eagle.org/eagleExternalPortalWEB/appmanager/absEagle/absEagleDesktop?_nfpb=true&_pageLabel=abs_eagle_portal_main_home_page>

**Q: ARE AUDITS PERFORMED? ARE THEY PERFORMED ON DRILLING OPERATIONS?
IF SO, ARE THEY RESOURCED INTERNALLY OR BY A THIRD-PARTY?**

Within the drilling and operating industry, audits are performed by multiple types of agents. Firms will perform their own internal audits to conform to both the American Petroleum Institute (API) and local, state, and national standards, although such audits are not necessarily required. External audits are also performed by the regulatory bodies or agencies that govern the industry. The governing body for offshore drill operators is the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE); formerly the Mineral Management Service (MMS)²⁰. These audits often focus on operational and safety risks, and are performed to determine whether a firm abides by the current regulatory standards. This agency states that rig inspections should be conducted every month.²¹

Additionally, third parties are sometimes hired by firms to perform audits. As noted above, Transocean Limited hired Lloyd's Register to evaluate its rig operations prior to the accident. Lloyd's Register found that Transocean's practices were rather ineffective, particularly its safety culture.²² Lloyd's also found that rig maintenance was not on par with what is typically expected of a similar vessel. In light of the April incident, this suggest that firms may fail to plan and act despite input received from independent parties.

²⁰Bureau of Ocean Energy Management, Regulation, and Enforcement, www.boemre.gov

²¹ Strickler, Laura "BP Rig Missed 16 Inspections Before Explosion", CBS News, 11 June 2010 http://www.cbsnews.com/8301-31727_162-20007514-10391695.html

²² "Report Commissioned Before BP Oil Spill Highlights Problems aboard Deepwater Horizon, Other Transocean Rigs", NewsInferno, 5 August 2010. <http://www.newsinferno.com/archive/report-commissioned-before-bp-oil-spill-highlights-problems-aboard-deepwater-horizon-other-transocean-rigs/>

With regard to insurers, audits can be performed in two ways. The first type of audit is the due diligence an insurance firm performs to determine whether it should underwrite the risk posed by a firm. This includes periodic updates an insurer or firm conducts to make certain that the current insurance policy reflects the risks posed by the client's current operating environment.

The second type of audit is the analysis performed by an insurer when a claim is filed. The purpose of this audit is to determine whether the claim is legitimate or whether any fraud has occurred. Insurers examine historical loss data and may even look at management incentives such as whether rig supervisors are monetarily incentivized to promote rig safety.²³ This information is then used in combination with actuarial analyses and underwriter industry experience to determine the amount risk and subsequently the appropriate premiums.

²³ Malone, Scott. "Investors Seek Oil Firms' Safety Plans, Insurers' Underwriting Plans." Insurance Journal. 5 August 2010. <<http://www.insurancejournal.com/news/national/2010/08/05/112229.htm>>

Q: DOES THE OPERATOR OR THE DRILLING COMPANY HAVE FINAL SAY OVER SAFETY PROCEDURES ON THE DRILLING RIG?

According to a Booz Allen Hamilton industry expert, the operator trumps the driller regarding safety practices and procedures followed during drilling operations. The driller may refuse measures it deems dangerous or unnecessary; however, the driller runs the risk of being held liable if it does not comply with the operator's procedures and an incident occurs.

Numerous attempts to verify this with publically available data have proved unsuccessful. It does appear that this matter is somewhat ambiguous. As discussed below, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) recently issued a rulemaking increasing the operator's accountability.

In the offshore oil and gas industry, preventing accidents is a top priority for both the operators and regulators. The regulations in 30 CFR 250²⁴ govern important drilling operations on the outer continental shelf. These regulations are prescriptive in nature and convey the minimum requirements for safe operations. Operators, who are required to meet these regulations, hire drilling companies to drill and complete wells. This entails conducting the drilling, well casing and cementing, stimulation work, and zonal isolation. As contractors, the drillers are required to comply with the regulations set forth in 30 CFR 250, advise the operators if increases in safety measures are needed, and report any irregularities to the operators overseeing the work.

²⁴ MMS Proposed Rule 30 CFR 250. URL: http://www.boemre.gov/federalregister/PublicComments/Sub_A_Comments/subacomm.pdf

BOEMRE regularly conducts drilling inspections to ensure operators (and drillers) are complying with the applicable safety regulations.²⁵ On the drilling rigs, 160 items are checked for potential violations.²⁶ Depending on the severity of the violation, regulators may call for the entire well to be “shut-in.” Research has shown that in certain cases drillers may not implement the appropriate level of safety measures and procedures in an effort to avoid increasing costs and subsequently decreasing profit margins. Due to safety violations committed by drilling companies in 2009, 20 facilities were shut-in, generating losses in revenue to operators.²⁷

The U.S. Department of Interior recently compiled a set of recommendations,²⁸ which increased operators’ accountability by requiring the incorporation of environmental and safety management best practices into their operating plans and procedures for their offshore platforms. These recommendations resulted in BOEMRE issuing NTL No. 2010-N05, which implements certain safety measures outlined in a report entitled “Increased Safety Measures for Energy Development on the Outer Continental Shelf.” Clearly identifying the party responsible for effectuating safe operating practices will likely lead to safer outcomes.

²⁵ According to the Department of Interior, in 2009, the industry drilled 331 wells in the Gulf of Mexico and 561 drilling inspections were conducted. See the *Increased Safety Measures for Energy Development on the Outer Continental Shelf* report (May 27, 2010).

²⁶ US Department of Interior. *Increased Safety Measures for Energy Development on the Outer Continental Shelf*. May 27, 2010.

²⁷ US Department of Interior. *Increased Safety Measures for Energy Development on the Outer Continental Shelf*. May 27, 2010.

²⁸ US Department of Interior. *Increased Safety Measures for Energy Development on the Outer Continental Shelf*. May 27, 2010.

Q: WHAT DO INSURERS BELIEVE TO BE THE LARGEST RISKS?

Many if not most insurers are concerned that their methods and processes for understanding and assessing risk associated with deepwater drilling operations have lagged the energy industry's technological advances. Furthermore, rating assumptions have not been as dynamic as they should have been.²⁹ Prior to policy renewals in the June-July time frame, insurers indicated that they anticipated adding broadly worded, event specific exclusions to prospectively eliminate coverage for a deepwater event, such as the Deepwater Horizon spill.³⁰ Insurance brokers, who work on behalf of companies seeking coverage, were working with insurance companies/underwriters to better understand the risks associated with these assets, particularly in an attempt to avoid overly narrow wording of renewal policies.³¹

As a related concern, underwriters appear to believe that although safety measures, procedures and manuals may be well documented, execution of these procedures may be more lax than stakeholders would prefer.³² Similar to insurance underwriters, investors want to ensure that the appropriate incentives are in place so as to mitigate or -- even better -- eliminate most risk. One proposed solution is to make compensation and incentive packages for senior

²⁹ Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf>

³⁰ "Market Development Relating to Deepwater Horizon Event" Marsh Risk News, 2 July 2010. <<http://global.marsh.com/deepwaterhorizon/index.php>>.

³¹ "Market Development Relating to Deepwater Horizon Event" Marsh Risk News, 2 July 2010. <<http://global.marsh.com/deepwaterhorizon/index.php>>. See also Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf>

³² "Investors Urge Energy Companies to Disclose Deepwater Drilling Info." 9 August 2010. <http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20821>. See also Harrison, Selina. "Effective Board Oversight of Safety and Risk Management in the Energy and Utilities Sector." *Financier Worldwide*. September 2010. <<http://www.financierworldwide.com/article.php?id=7168&page=2>>

management include specific links to environmental health and safety targets.³³ Stakeholders are also looking for increased transparency, such as evidence that companies have robust spill contingency plans and clear guideline for contractor selection oversight.³⁴ For example, this summer investors sent letters to major energy companies asking them to disclose information about their oil spill prevention and response plans.³⁵ It is critical that investors perceive that companies engaged in low-occurrence but high-risk, high-consequence deepwater exploration have risk mitigation policies in place that truly reduce risk. Otherwise, investors will be unwilling to participate in the capital markets that generate the funds necessary to insure these operations.³⁶

It is important to note that the Deepwater Horizon event is serving as a learning opportunity. This event tested the industry's ability to prevent and then respond to a disastrous event. Energy firms, insurers, and investors are gaining a better understanding of the technology available and processes to prevent similar incidents.³⁷ This is expected to result in the industry's enhanced ability to reduce risk and respond to events more quickly, while also allowing underwriters to more accurately assess similar risk and then price accordingly.

In summary, insurers who underwrite policies in the E&P market believe they are facing two major risks. First, insurers question whether their methods for

³³ "Deep Water, Deep Trouble." The Wall Street Journal. 6 October 2010.
<http://online.wsj.com/article/SB10001424052748703453804575479643629599782.html>

³⁴ "Deep Water, Deep Trouble." The Wall Street Journal. 6 October 2010.
<http://online.wsj.com/article/SB10001424052748703453804575479643629599782.html>

³⁵ Gronewold, Nathaniel. "Investors Ask Oil, Insurance Groups to Disclose Safety Plans." The New York Times. 5 August 2010. < <http://www.nytimes.com/gwire/2010/08/05/05greenwire-investors-ask-oil-insurance-groups-to-disclose-67189.html>>

³⁶ As mentioned in an earlier installment of our report, there are growing concerns that there may not be enough capital available in the short-term to meet increasing demand for fuller coverage. Therefore, increased transparency and the propose use of incentives will be ever more critical in getting funds injected into the capital insurance markets.

³⁷ Aon Energy Insurance Market Update. >http://www.aon.com/about-aon/intellectual-capital/attachments/risk-services/Aon_Energy_Q2_2010_Newsletter.pdf>

understanding and assessing risk associated with deepwater drilling operations reflect the energy industry's technological advances. Second, insurers and investors are concerned that the execution of safety procedures may be more lax than stakeholders would prefer. However, the insurance industry views the Deepwater Horizon event as a learning opportunity to better understand drilling operations and appraise the market accordingly.