

# What BP Teaches Us About Risk Management: Technical, Financial, and Company Culture Factors

October 18, 2011

University of Texas–Dallas

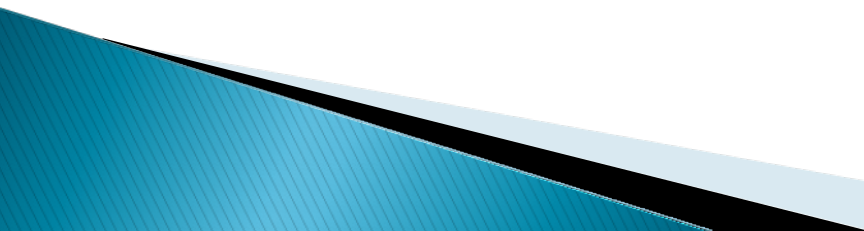
L. A. Starks Books & Starks Energy  
Economics

[Lastarksbooks.com](http://Lastarksbooks.com)

[Starksenergyecon.com](http://Starksenergyecon.com)



# Macondo Impact

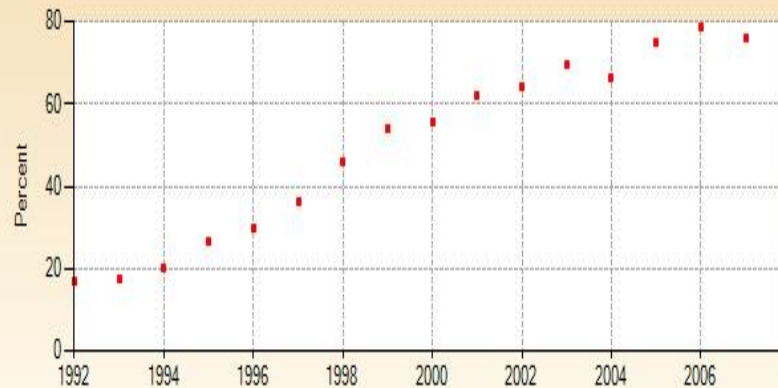
- ▶ 11 people killed, 17 injured
  - ▶ 4.9 million barrels of oil spilled, the largest accidental marine oil spill ever
  - ▶ Well flowed for three months before being capped
  - ▶ Litigation begins February 2012
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.
- 

# GOM Oil Production

- ▶ 29% of US crude oil production in 2010 came from the Gulf of Mexico
- ▶ 65 discoveries in water depths of more than 5000 feet
- ▶ BP's: Thunder Horse Platform: 260,000 BPD of oil and 220 MMCF/D gas from 7 wells—biggest in GOM
- ▶ GOM only open area with large potential, coming off \$148/bbl oil
- ▶ GOM has 3500 platforms and rigs
  
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

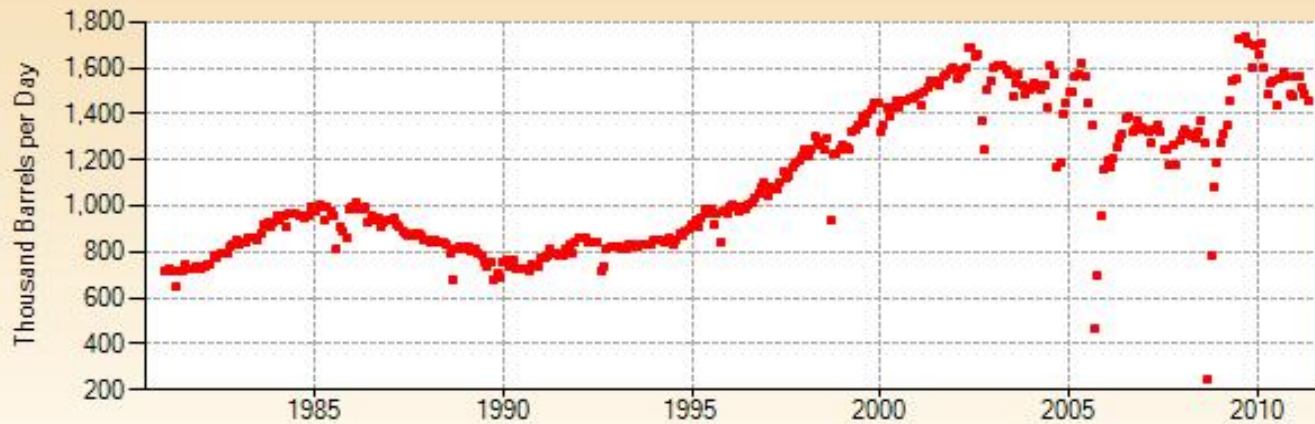


### Annual Gulf of Mexico Federal Offshore Percentage of Crude Oil Production from Greater than 200 Meters Deep



Source: U.S. Energy Information Administration

### Monthly Federal Offshore--Gulf of Mexico Field Production of Crude Oil



Source: U.S. Energy Information Administration

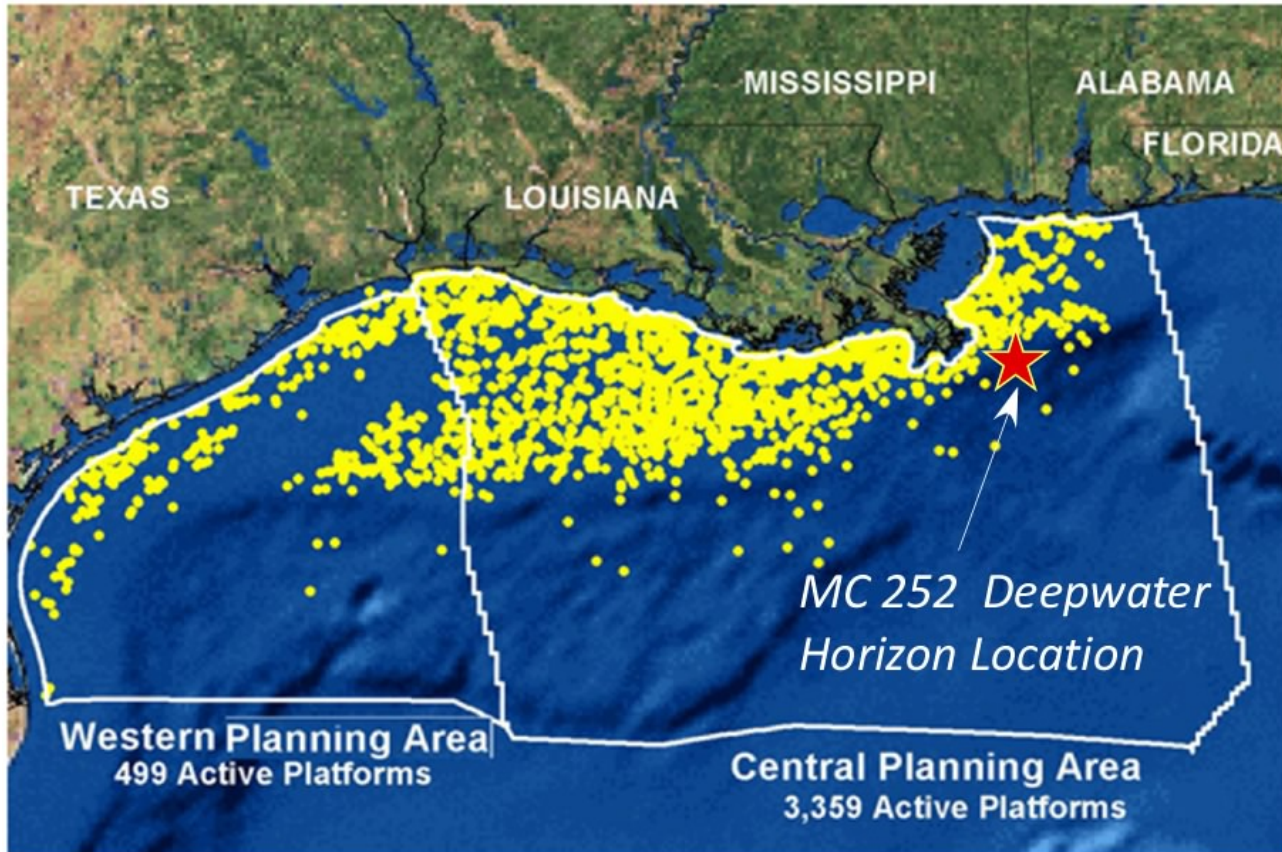
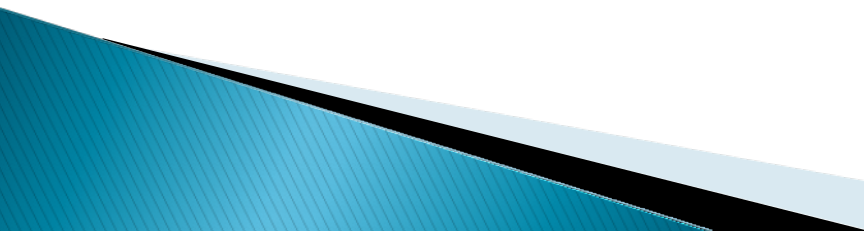


Figure 1. Mississippi Canyon Block 252 Location Map. From U.S. Minerals Management Service

# Cultural Factors

- History as a quasi-Govt entity: used to dealing with foreign governments (Russian problems)
- ▶ Govt sold interest in 1995. Lord Browne the CEO.
- ▶ Big projects, slashed costs (low oil prices), laid off tens of thousands of employees, including engineers, outsourced operations, including accounting, BP as financial entity.
- ▶ London vs. Houston vs. field
- ▶ Greens: BP=“beyond petroleum” (“but I’m in the petroleum side” of BP)
  
- ▶ Disclaimer: All conclusions are author’s own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# BP & Texas City Refinery

- ▶ March 2005 Texas City Refinery explosion killing 15 and injuring 180
  - ▶ Five managers in six years
  - ▶ 460,000 BPD (large) and capital-starved
  - ▶ Tower overfilled, overfull alarms didn't work, lack of communication among over-tired shift workers
- 
- ▶ **Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.**
- 

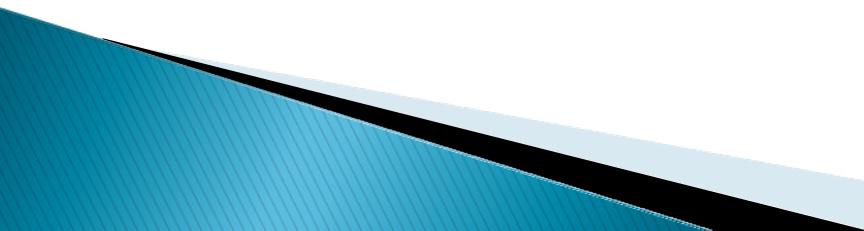
# BP & Thunder Horse, July 2005

- ▶ Check valve installed backwards caused vessel to flood during Hurricane Dennis
- ▶ Bad welding job
- ▶ Online in 2008, significant production, 4% of US oil

- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.



# Alaska Pipeline Leak, 2006

- ▶ 267,000 gallons of oil (6360 barrels) leaked due to corrosion in several miles of under-maintained pipeline—“worst spill on the North Slope”
  
  - ▶ Disclaimer: All conclusions are author’s own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.
- 

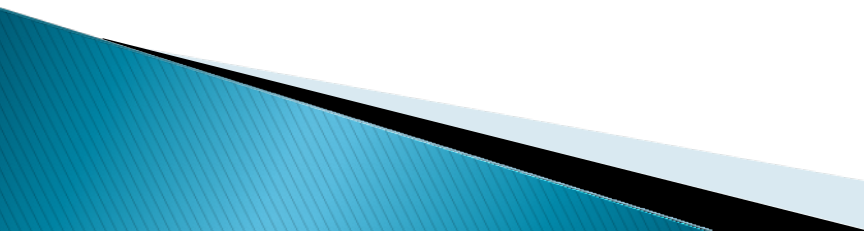
# BP's Importance to UK

- ▶ BP employs 10,000 people in the UK, 23,000 in US
- ▶ 1 of every 7 pounds paid in dividends to UK pension funds by FTSE 100 companies comes from BP
- ▶ 1.8 million people in UK either own BP shares or pay into a pension fund holding BP, 39% of shares are held in the US
- ▶ 5.8 billion pounds (about 11.6 billion \$) of taxes paid in UK in 2009 were linked to BP: national income tax, national insurance paid by its employees, fuel excise duty and VAT paid by its customers
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by any of the companies or individuals involved.

# Financial & Industry Factors

- ▶ BP started well w/Transocean Marianas October 7, 2009. Hurricane Ida damaged it in November, so Transocean replaced Marianas w/Deepwater Horizon, but not until February 6, 2010. Drilling was estimated to take 51 days at a cost of \$96MM. By April 20, rig was overdue at an additional cost of \$21 MM, accruing at \$1MM/day. Many decisions appeared to turn on extra time required.
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# Technical Factors 1 / 7

- ▶ 3 days before, warning about last-minute procedural changes
  - ▶ 11 hours beforehand, crew argued over drilling plan re final shutdown steps for nearly complete well
  - ▶ Contention over replacing heavy drilling mud w/lighter seawater
  - ▶ BP had final say as operator
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.
- 

# Technical Factors 2/7

- ▶ Lost circulation zone while drilling--known
  - ▶ A claim of second gas zone several hundred feet above bottom of the well. Would have caused casing redesign
  - ▶ Regs require top of cement between hole & casing to be 500 feet above top of hydrocarbon bearing sands—would change string design to short string from long string
  - ▶ Would have required more cement, requiring redesign of cement, too
  - ▶ If zone existed & was not covered with cement—could have been gas source
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# Technical Factors 3/7

- ▶ Did not fully circulate drilling mud, something normally done before cementing to safely remove any pockets of gas & other debris so cement is not contaminated. Full procedure takes 12 hours.
- ▶ Pumping Cement: tricky mixture (nitrified); not unusual for cement to fail
- ▶ Did not run 9–12 hour cement bond log to assess cement seal
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# Technical Factors 4/7

Single long-string casing instead of multiple individual casings so could use as production well

Single string of casing meant well had just 2 barriers to gas flow:

a) the cement at the bottom of the well and b) the seal at the wellhead on the sea floor

51 bbl of cement used, 1000–2000 feet coverage

More fluid leaving well than put in; not observed because also offloading drilling mud

▶ **Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.**

# Centralizers (Tech factors 5 / 7)

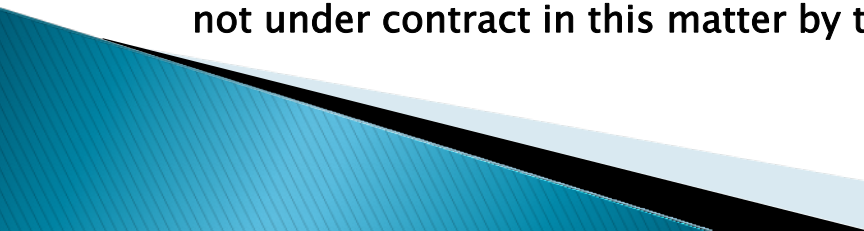
- ▶ Centralizers keep drilling pipe centered in the well bore. Otherwise hard to get the drilling fluid out from narrow open space around casing. Cement may not seal properly. Channels can form allowing gas to flow up an open space around the casing.
- ▶ 21 centralizers ordered, some wrong size delivered.
- ▶ Decided not to wait for right-size centralizers. Used 6.
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by any of the companies or individuals involved.



# Technical Factors 6/7

- ▶ “Insufficient centralizers meant severe risk cement job would fail. Lack of cement bond log meant BP was unable to check this.
- ▶ BP did not deploy the casing ‘lockdown sleeve’ that would have prevented the seal from being blown out from below. Even when cemented in the well head, casing can become buoyant and rise up, creating an opportunity for oil and gas to break through the wellhead seal and enter the riser to the surface. The lockdown sleeve prevents this.” House of Commons hearings
- ▶ Disclaimer: All conclusions are author’s own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# Technical Factors 7/7

- ▶ **\*\*Negative pressure test determines well integrity—was erroneously read as being successful; results confusing; second opinion not sought**
  - ▶ **\*\*Replacement of drilling mud with seawater (big difference in density; seawater is less dense and so offered less resistance to gas surge)**
  - ▶ **Displaced mud in riser before setting the cement plug**
  - ▶ **BOP (blowout preventer) worked (temporarily) but force of initial gas blowout buckled & bowed drill pipe. Blind shear rams of BOP not designed to cut out-of-place pipe. (apparently within 1.4 inches of preventing the spill\*\* blades stuck only that far apart)**
  - ▶ **Temporary closure gave way**
- 
- ▶ **Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.**
- 

# What Appears to Have Happened

Failure of annular or shoe cement, float collar failed  
Drill string and pipe pressures became erratic, increasing & decreasing. Last minute, drill pipe pressure went from 1000 to 6000 psi.

Gas escaped up the borehole due to cement failure, pushed mud up onto rig (9:41 PM).

BOP was initially activated but pipe not fully cut? 9:47 BOP stopped gas flow but gas had already reached the rig floor

Workers diverted gas onto rig system (pollution-prevention)—normally right call, instead of over the side, another close call. Too much gas, overwhelmed the system.

Gas caused an engine to overspeed, was probably ignited by that engine

Gas ignited 6–8 minutes after mud appeared on rig floor, explosion knocked out power, no way to trigger blind shear rams, temporary valve reopened, oil spilled

- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.



22 14:51



22 17:20





# Macondo/BP Oil Spill– Repercussions

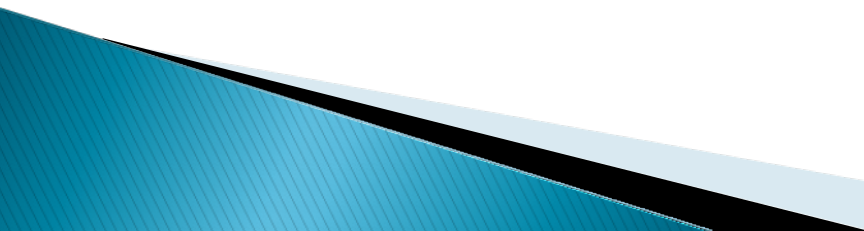
- ▶ Drilling moratorium: 12 rigs moved out of GOM, 20 remain, not enough approved permits, 8–20 may move, slowed Arctic approval
- ▶ Moratorium = loss as much as of 375,000 BPD (130 MMBbl/year) in 2011 and a loss of 550,000 BPD (200 MMBbl for year) in 2012
- ▶ Shift of capital to onshore drilling
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.



# Lessons in Risk Management

- ▶ Not one single mistake, but many
  - ▶ Lack of strong engineering culture and support, with 1990s carryover emphasis on financials led to loss of safety focus
  - ▶ Time/money pressure trumped
  - ▶ Lack of communication/change in personnel making decisions at critical juncture (staffing/critical skills management)
  - ▶ Need for more emergency training
- ▶ Disclaimer: All conclusions are author's own. Material is from public sources. Starks is not under contract in this matter by the agencies, companies or individuals involved.

# Monitor & Control Risks Starks Energy Economics

- ▶ New energy investments website
  - ▶ Analysis of public companies in specific market segments for energy investors
  - ▶ Segments include: Mississippian (NOk, SKs) oil, MidContinent refiners, fuel ethanol producers, Eagle Ford E&P companies, Bakken E&P companies
  - ▶ Subscription-based, one month free trial,
  - ▶ <http://starksenergyecon.com>
- 

# L. A. Starks Books

- ▶ *Fiction by L. A. Starks:*

- ▶ **13 Days: The Pythagoras Conspiracy**, by L. A. Starks
- ▶ E-book ISBN 978-1-60318-357-4, published by L&L Dreamspell, October 2010. Available from Kindle, Nook, multi-format Fictionwise (twelve e-reader platforms including the popular ePub standard), Overdrive for libraries, Kobo, and OmniLit.
- ▶ Print ISBN 978-1-933285-45-0, published by Brown Books Publishing Group, May 2006.
  
- ▶ “Gumbo File,” in **Dreamspell Nightmares** anthology, edited by Lisa Rene Smith
- ▶ Print ISBN 978-1-60318-150-1, published by L&L Dreamspell, October 2010.
- ▶ E-book ISBN 978-1-60318-151-8, published by L&L Dreamspell, October 2010. Available from Kindle, Nook, multi-format Fictionwise (twelve e-reader platforms including the popular ePub standard), Overdrive for libraries, Kobo, and OmniLit.
  
- ▶
- ▶ **Back-Story Short Stories** on Amazon Kindle
- ▶ *Robert and Thérèse Guillard: Choices* gives an alternative subplot for 13 DAYS’ Parisian antagonist and how it feels to fly in a wingsuit.
- ▶ *A Time for Eating Wild Onions* introduces two key characters in the second book. The tragedy that befalls them profoundly shapes the next generation.

# 13 Days' Plot, Refinery Diagram, & Reviews

- ▶ “This is an enjoyable and interesting thriller that showcases too well the current and ongoing vulnerability regarding U. S. oil production and processing . . . Oil production and processing is a highly complex subject and the author draws upon her long career in the industry to write what she knows . . . the author conveys real world concerns while delivering a good story worth reading.”  
Kevin Tipple – – – [Blogger News Network](#)
- ▶ “A gripping yarn of industrial espionage that keeps the reader guessing until the very end . . . Oil industry readers will appreciate the dedication of Lynn Dayton who leads by example. . . This is an excellent first novel.”  
Roger Herrera – – – [Petroleum News](#)
- ▶ “A complex plot, well written . . . An excellent first thriller by L.A. Starks.”  
– – – Techno-Thriller Magazine
- ▶ Very realistic. Thankfully, most weeks aren't as intense as these are.”  
CR – – – oil company vice president
- ▶ “This was a very fast-paced book! I couldn't put it down! It is a superb blend of the oil business, current events, and international intrigue. I felt like I was experiencing a front-page news story.”  
Kathy Norderhaug – – – international oil executive
- ▶ “Thanks for writing such a suspenseful book.”  
Mike Witzgall – – – (ret.) Dallas Police Department SWAT team member
- ▶ “13 DAYS is a suspense thriller with an engineering twist. With the oil refining industry as a backdrop, Starks weaves a story with lots of turns and subplots to keep you guessing. It's a great read!”  
L. Gros – – – marketing manager, global petrochemical company
- ▶ “A great thriller, in the tradition of John Grisham and Dick Francis. Full of interesting insights into the energy business, 13 DAYS features a tightly woven plot and vivid characters.”  
Mike Barron – – – retired energy CFO and senior vice president
- ▶ “13 DAYS weaves a gripping suspense plot around the very real, and complex operations of oil refining. The attention to detail and factual content is extraordinary, while creating a spellbinding story that we hope could not be real.”  
KS – – – vice president, energy industry consulting firm