The National Commission on the

BP DEEPWATER HORIZON OIL SPILL AND OFFSHORE DRILLING

Learning from Macondo

Staff Presentation to the Commission

December 2, 2010

Outline

- **Part I:** A Persistent Pattern of Problems
  - Recognize that Macondo was an avoidable accident
  - View the Macondo accident in the context of Safety Management
- **Part II:** Solutions for Industry
  - Transform the industry safety culture
  - Practice rescue, response, and containment

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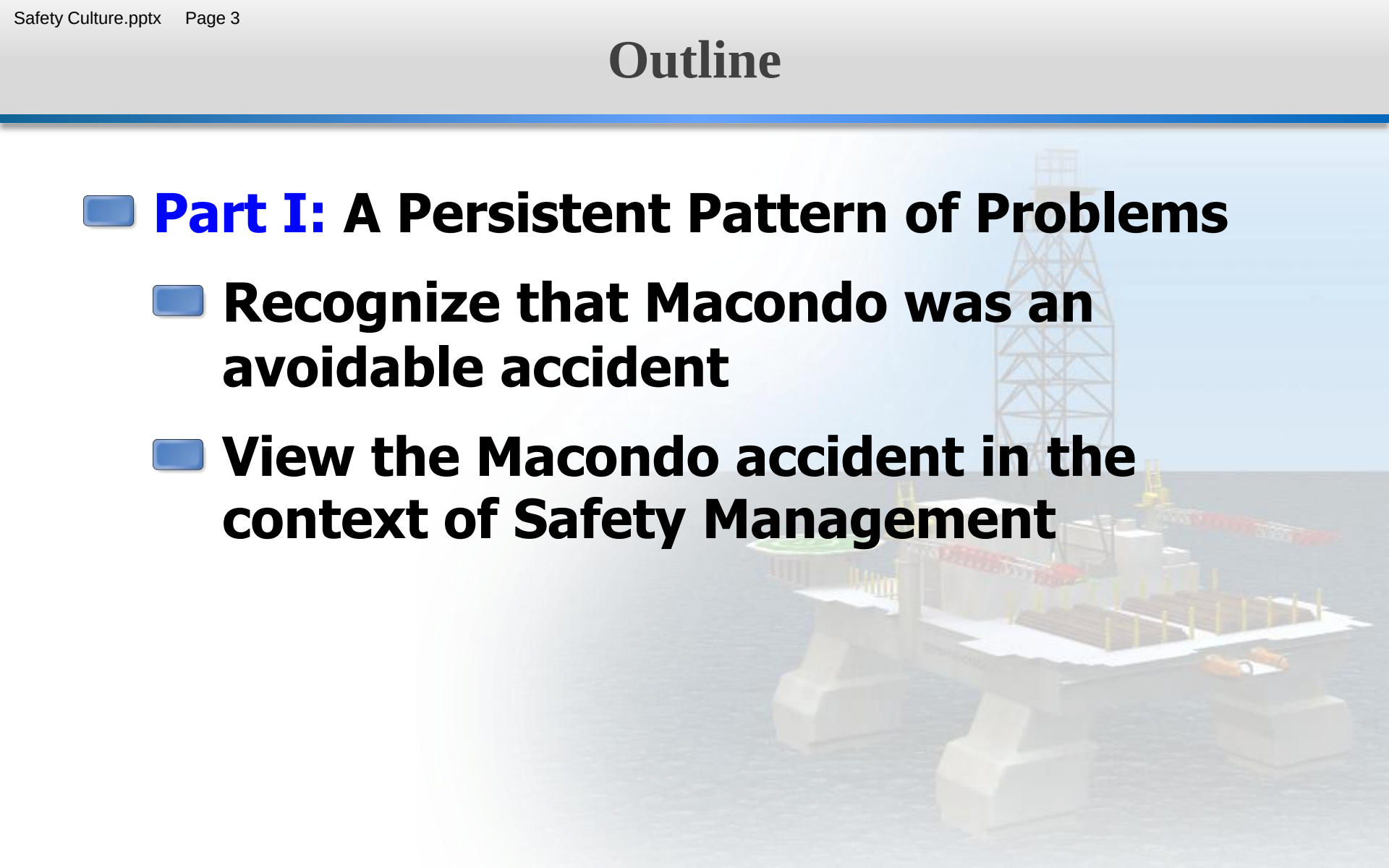
- **Part I: A Persistent Pattern of Problems**
  - **Recognize that Macondo was an avoidable accident**
  - **View the Macondo accident in the context of Safety Management**



Preliminary Conclusions – Managerial

Observations

- **Individuals should be trained to repeatedly question data, raise concerns, and double-check assumptions.**
- **Greater attention should be paid to the magnitude of consequences of all anomalies, even seemingly minor anomalies.**
- **Individual risk factors cannot be considered in isolation but as an overall matrix. Personnel cannot ignore anomalies after believing they have addressed them.**
- **There should be greater focus on procedures and training in how to respond to low-frequency, high-risk events. "How do you know it's bad enough to act fast?"**
- **There was a failure to develop or adopt clear procedures for crucial end-of-well activities.**
- **Poor communication between operator and subcontractors deprived otherwise capable personnel of information necessary to recognize and address risks.**
- **There were muddled lines of authority within BP and between BP and its contractors.**

Preliminary Conclusions – Managerial

- **The Commission's investigation team found that most of the mistakes and oversights that led to the blowout were the result of management failures by BP, Halliburton, and Transocean.**

Risk Awareness & Risk Management

- BP's management systems did not ensure that the Macondo team identified and evaluated risks that their decisions had created.
- Specifically, and as a result, changes to the well design and procedures made in the month prior to the blowout created risks that were not adequately addressed by the Macondo team

Decision Making

- **It appears that many key decisions were made by the Macondo team without formal risk analysis or internal expert review.**
- **At Macondo, several key decisions variously:**
  - Addressed one risk while increasing overall risk profile.
  - Failed to take full advantage of shore-based expertise.
  - Demonstrated an over-reliance on individual preferences and experience.
  - Lacked guidance from established best practices.

Communication Failures Reduced Risk Awareness

- **BP, Transocean, and Halliburton failed to communicate adequately.**
  - BP did not share important information with its contractors, or sometimes even within its own team.
  - Contractors did not share important information with BP or each other.
- **As a result, individuals made critical decisions without fully appreciating their context or importance.**

Example – Cement Testing

- **Halliburton and BP management processes did not ensure that cement was adequately tested before pumping.**
  - Halliburton didn't have sufficient controls in place to ensure that its personnel tested cement in a timely manner or rigorously vetted test results.
  - BP personnel did not ensure that Halliburton completed testing before pumping cement, despite recognizing problems with timeliness of Halliburton's cement testing.

Example: Communication About the Cement Job

- **BP and Halliburton employees knew that the cement job would be difficult but did not adequately communicate these issues to the rig crew.**
- **Neither the BP well-site leaders nor the Transocean crew consulted anyone on shore about anomalies in the negative pressure test.**
- **If these challenges and anomalies had been better communicated, *the Macondo blowout could have been prevented*.**

Examples - Decisions

- Given the risks inherent in deepwater drilling, companies must create and enforce policies to ensure that decisions made to reduce costs and improve efficiency do not increase risks or diminish safety.
- Without such policies, financial pressures will likely bias decisions in favor of time and cost savings.
- BP did not have these policies and systems in place, or if they did, did not use or enforce them at Macondo.

Various Decisions That May Have Increased Risk

Decision	Riskier than Alternative	Less Time Than Alternative?	Was Decision Necessary?	Decision-maker
Not waiting for more centralizers	Yes	Saved Time	No	BP on shore
Not reevaluating cement slurry design	Yes	Saved Time	No	Halliburton on shore
Not waiting for foam stability results	Yes	Saved Time	No	Halliburton (and perhaps BP) on shore
Not running diagnostics on float equipment to ensure conversion or seal	Yes	Saved Time	No	BP on shore and rig
Using combined spacer and not flushing from system	Yes	Saved Time	No	BP and MI-Swaco on shore and rig
Displacing mud from riser before setting plug	Yes	Unclear	No	BP on shore
Setting surface cement plug 3000 feet deep in seawater	Yes	Unclear	No	BP on shore
Not running cement evaluation log	Possibly	Saved Time	No	BP on shore
Not installing additional plugs or barriers	Yes	Saved Time	No	BP on shore
Undertaking simultaneous operations that could confound kick detection	Yes	Saved Time	No	Transocean (and perhaps BP) on rig
Bypassing pits and flow out meter during displacement	Yes	Saved Time	No	Transocean (and perhaps BP) on rig

Better Management Could Have Prevented The Blowout

- **Better management systems would almost certainly have prevented the blowout by improving the ability of individuals involved at Macondo to identify the risks they faced, and to properly evaluate, communicate, and address them.**

BP: One of the World's Largest Integrated Oil Companies

- **BP's history of cost-cutting and resulting problems across all business segments and over many years suggests systemic corporate culture issues.**
  - Grangemouth Refinery complex – 2000
  - Forties Alpha Production Platform – 2003
  - Texas City Refinery – 2005
  - Thunder Horse Platform - 2005
  - Prudhoe Bay Pipeline - 2006
  - Deepwater Horizon - 2010
  - Texas City Refinery (again) - 2010
  - BP pipelines across Alaska – 2010

- **BP safety lapses appear to be chronic; its systems safety engineering and safety culture still need improvement.**

BP Grangemouth Complex - 2000

- **The UK Health and Safety Executive investigated three potentially life-threatening accidents that took place between May 29 and June 10. About the power loss, it said:**
  - "Subsequent investigations revealed a number of weaknesses in the safety management systems on-site over a period of time which contributed to the succession of events that resulted in the power distribution failure."
- **It made virtually the same comment about the other two incidents.**

Texas City Refinery Explosion - 2005

- The U.S. Chemical Safety Board accident investigation found:
- "The BP Texas City tragedy is an accident with organizational causes embedded in the refinery's culture. The CSB investigation found that organizational causes linked the numerous safety system failures that extended beyond the ISOM unit."

Texas City Refinery Explosion - 2005

- The Baker Panel noted similarities between the lessons of Grangemouth and the Texas City blast, including the lack of management leadership, accountability, resources, poor understanding of and a lack of focus on process safety, coupled with inadequate performance measurement indicators, and untimely completion of corrective actions from audits, peer reviews, and past incident investigations.
- The panel concluded that, “in its response to Grangemouth, BP missed an opportunity to make and sustain company-wide changes that would have resulted in safer workplaces for its employees and contractors.”

Halliburton: The World's Largest Cementer

- Halliburton is the largest company in the global oil field cementing business, which accounted for 11% of the company's business, or $1.7 billion in 2009.

- For all of its experience, Halliburton prepared cement for BP, one of its major clients, that had repeatedly failed laboratory tests. And Halliburton managers on shore let its team, Transocean, and BP continue with a cement job without timely and positive stability results.

Halliburton

- Halliburton was also the cementer on the Montara well that suffered a blowout in August 2009, off the coast of Australia.
- The accident inquiry confirmed that cementing problems led to the blowout.
- While specific cementing problems at Montara were different from mistakes at Macondo, in both cases management processes by the operator and Halliburton failed to ensure the crew achieved a good cement job.

Transocean: World's Largest Deepwater Driller

- Transocean has its own safety culture problems.
- In February, the UK Health & Safety Executive accused some of the company's offshore managers "of bullying, aggression, harassment, humiliation, and intimidation" [towards their staff] according to Upstream, an industry trade journal that had seen a copy of the report.

Transocean's Safety Culture

- **Early in 2010, Transocean contracted Lloyds Register to review its safety management and safety culture after "a series of serious accidents and near hits within the global organization." (p6)**

- **Of the four North American rigs that Lloyd's visited, the Deepwater Horizon was the highest performing with scores solidly in the twos and threes on a five point scale.**

- ***In the area of hazards identification, Lloyd's Register's findings are very consistent with Commission's finding on what happened at Macondo.***

Transocean's Safety Culture

- **"[A] fundamental lack of hazard awareness underpins many of the issues in the North America Division." (p12)**
- **Transocean Supervisors and rig leaders themselves believed:**
  - "The workforce was not always aware of the hazards they were exposed to . . . "
  - "THINK (or [Risk management]) plans did not always identify relevant major hazards related to that task."
  - "[R]isks posed by identified hazards were not fully understood . . . "
  - "Emerging hazards during task execution, and hazards with a changing risk level were not always detected or fully appreciated."
  - "'[Rig crews] don't always know what they don't know.'" (p9)
- **"[F]ront line crews are potentially working with a mindset that they believe they are fully aware of all the hazards when it is highly likely that they are not." (p9)**

Gulf of Mexico Accidents

List of Incidents

1979 PEMEX	Blowout & Fire
1987 McMoran Oil&Gas	Blowout
1989 Arco	Fire
1990 Norcen Explorer	Blowout
1992 Arco	Loss of Well Control
1994 Chevron	Loss of Well Control
1996 Oryx Energy	Blowout & Fire
1997 American Exploration	Blowout & Fire
1997 Sonat Exploration	Blowout
1998 Union Pacific Resources	Fire
1999 Vastar	Fire
1999 Newfield Exploration	Blowout & Fire
2000 Murphy	Blowout
2001 Tri-Union	Loss of Well Control
2001 Forest Oil	Blowout
2001 Helis	Blowout
2001 Devon Energy	Blowout
2002 BP	Loss of Well Control
2002 BP	Blowout & Fire
2003 Anadarko Petroleum	Loss of Well Control
2003 Chevron	Loss of Well Control
2004 Orca Management	Loss of Well Control
2004 Energy Partners, LTD	Loss of Well Control
2005 W&T Offshore	Loss of Well Control
2005 BP	Partial Sinking
2005 Chevron	Loss of Well Control
2006 Forest Oil	Loss of Well Control
2007 Apache	Blowout
2007 Rooster Petroleum	Blowout
2007 PEMEX	Collision
2008 Apache	Loss of Well Control
2010 BP	Blowout & Fire
2010 Mariner Energy	Fire

Legend

- Fire
- Blowouts
- Loss of Well Control

International Accidents

List of Incidents

1977 Ekofisk Bravo: Phillips
1980 Alexander L Lielland: Phillips
1982 Ocean Ranger: Mobil
1983 Glomar Java: Mobil
1984 Enchova: Petrobras
1987 Steelhead: Marathon
1988 Enchova: Petrobras
1988 Piper Alpha: Occidental
1989 Seacrest: Unocal
2001 Roncador: Petrobras
2003 Brent Bravo: Shell
2004 GSF Adriatic: Petrobel
2004 Snorre A: Statoil
2009 Montara: PTTEP
2010 Gullfaks C: Statoil

Outline

- **Part II: Solutions for Industry**
  - **Transform the industry safety culture**
  - **Practice rescue, response, and containment**

"It's a risky business. But the presence of risk does not mean accidents have to happen…."

-- Magne Ognedal, Director-General
Norway's Petroleum Safety Authority

"If we don't learn lessons from this disaster, it will have been a double tragedy."

-- Rex Tillerson, CEO,
Exxon Mobil

(Post Montara and Macondo)

- International Regulators Forum (IRF) Consensus Findings and Recommendations for industry and governments

- Single Safety Regulator:
- Risk Based Regulation:
- Continuous Improvement:
- Communication and Learning:
- International Standards:
- Peer Audits:

International Regulators Forum (IRF) Consensus Findings and Recommendations (Post Montara and Macondo)

Single Safety Regulator: Regulatory regimes function most effectively when a single entity has broad safety and pollution prevention responsibility. Core responsibilities and objectives must be clearly identified. Gaps, overlap, and confusion are not in the interest of safety or regulatory efficiency.

Risk Based Regulation: Safety management and regulatory priorities should be identified through a comprehensive risk assessment program. Training and competency development programs should be updated to reflect the new risk information. Regulators should challenge industry to resolve potential safety problems.

Continuous Improvement: Operators and contractors must manage their companies to achieve safety objectives and must continually assess the effectiveness of their management programs. New indicators must be explored and assessed, particularly for major hazards and safety culture. Worker input is also essential.

Communication and Learning: Continuous communication among regulators, operators, contractors, workers, industry associations and public interest groups is essential for continuous improvement. Offshore companies should regularly discuss the causes and implications of past accidents with their employees. Industry or government should maintain comprehensive and verified incident data bases.

International Standards: Best standards should be identified and applied internationally. "Not lowest common denominators, not options papers"

Peer Audits: Peer-based audit programs should be considered for both regulators and operators.

Making the Unsafe Safe

- **Other inherently risky activities have been made much safer: civil aviation, nuclear power, the nuclear navy.**
- **The leadership in all these areas came to recognition that they were only as safe as their weakest link.**
  - Agreed to hold themselves and peers accountable for safety
  - Set up mechanisms to make this real

Making Nuclear Power Safer – an Appropriate Analogy

- **Institute of Nuclear Power Operations (INPO) emerged from the 1979 Three Mile Island partial core meltdown.**
- **The president's commission investigating the accident created a clear social mandate for the industry to improve. Its first recommendation read:**

> "…the nuclear industry must dramatically change its attitudes toward safety and regulations. The Commission has recommended that the new regulatory agency prescribe strict standards. At the same time…the industry must also set and police its own standards of excellence to ensure the effective management and safe operation of nuclear power plants."

INPO Today

- INPO assesses plant performance – detailed, cross-functional evaluation of member companies' plants: operations, maintenance and engineering, including safety culture, self-assessment, and corrective action, operating experience, human performance, and training.
- Assesses operations performance and personnel training during exercises; start-ups, shutdowns, and major planned changes.

INPO's Influence – Power of Peer Pressure

- INPO "grades" and evaluation details are given to the company CEO by letter following plant evaluation
- In a private session at a yearly meeting of all utility CEOs, grades of all plants are announced
- For recipients, an "INPO 1" feels "like getting an Academy Award"
- Whereas, getting an "INPO 4" feels like taking a "walk of shame"
- INPO grades affect insurance premiums
- Lessons learned are shared across the industry
- ***INPO only works because it complements role of Nuclear Regulatory Commission! Everyone we interviewed stressed this.***

INPO by the Numbers

- INPO inspects 104 units spread across 66 sites operated by 26 nuclear power utilities
- An inspection takes 5-6 weeks, including 2 weeks to prepare, 2 weeks on-site, 1 week of internal review and a final week to prepare final report
- Typically, 40% of plants get an INPO 1, 40-50% get an INPO 2, and 10-15% an INPO 3 or 4; a plant rated 5 would likely be shut down by its operators

Challenge Industry to Create A Safety Institute for Oil and Gas

- **The Three Mile Island commission got it right: just substitute the name of the industry:**
- **the ~~nuclear~~ *oil and gas* industry must dramatically change its attitudes toward safety and regulations. … At the same time (as the regulatory agency improves) the industry must also set and police its own standards of excellence to ensure the effective management and safe operation of ~~nuclear power plants~~ offshore oil and gas production.**

Proposed Recommendation from Staff

On Industry and Government

- Offshore oil & gas E&P has long been guided by both voluntary industry standards and subject to government regulation and oversight.
- Deepwater Horizon suggests that system does not work well enough – it has failed to protect workers, the economy of the Gulf of Mexico, and the broader public interest.
- The next presentation will detail staff recommendations for how to improve the autonomy and competence of federal regulators.

On Industry and Government

- BUT … the question for this panel is whether the industry can up its own game without just waiting for the government to tell it what it has to do?
- Will the companies be sensible and support resources and polices needed to improve federal regulation?
- Can they demonstrate a new commitment to systems safety excellence by creating a complementary institution that relates to government much like the NRC-INPO relationship?

Objections and Doubts

- **Some industry people and regulators tend to resist an "INPO for oil:"**
  - Oil and nuclear are different; oil is more heterogeneous, more service providers, more types of technology
  - Industry structure: small number of very large companies and then many others: costs and influence
  - Issues of competition and confidentiality
  - And what of antitrust laws?

Safety is Not Proprietary

- **Whatever differences exist between nuclear and offshore oil and gas should not preclude the latter from achieving the apparent degree of safety of obtained by the former.**
- **Antitrust concerns have not prevented cooperation on safety and technology issues:**
  - *Shell's School for Industry*
  - *Deep Star Consortium*
  - *Marine Spill Response Company*
  - *Marine Well Containment Company*

The New "Safety Institute"

- Core mission: achieve excellence in system safety across offshore oil and gas industry
- Independent auditing function
- Cannot lobby – cannot be the American Petroleum Institute
- Company CEOs and boards of directors provide leadership and ensure engagement of employees with it
- Institute is empowered to use real rewards and sanctions to help all industry players overcome the enemies of safety – ignorance, arrogance, and complacency.

A Safety Institute Will Only Be Effective If…

- Companies are dedicated to it, remembering how one company's accident affects all
- It is flexible enough to improve safety in all aspects of the industry
- It is bureaucratically effective and autonomous
- There is transparency between the institute and the companies
- It holds the companies and their leaders accountable – a la INPO.

Safety Institute Only Effective If…

- **It is coupled with a proactive federal safety regulator**
  - New balance between baseline prescription and comprehensive, risk-based performance
  - Single federal agency solely responsible for safety
- **Recommendations for improving federal oversight of environment and safety of offshore will be elaborated in the next section**

Putting the *Strategy* in *Strategic*

- Oil as a strategic resource is important to US security and the US economy.
- But drilling for it in a reckless manner threatens American lives, jobs, businesses, and environmental resources.
- It is time for a national energy strategy that reflects our dedication to energy and economic security, safety and environmental protection.

The Industry Role in This Strategy

- Industry needs to do a better job at protecting jobs and livelihoods across the regions in which they operate: the oil, fishing, tourism jobs, and the natural and cultural environments that support them.
- Industry needs a strategic approach to prevention, containment or response that is truly ready when needed.
- Its two main consortia do not have good records responding to big events.
- The Alyeska consortium was ineffective with the Exxon Valdez spill. The Marine Spill Response Company was under-resourced for the Macondo spill.

Readiness & Response: A Practical Exercise

- **Companies individually and together must demonstrate their ability to prevent, respond to, and contain a worst case spill, through the following.**
  - Drills and exercises
  - Simulations
  - Strategic planning
  - Scenario-building
  - Equipment testing and maintenance
  - R&D of new equipment and procedures
  - Instrumentation
- **Preparedness is not a paper exercise.**

In Conclusion

- The BP Deepwater Horizon disaster undermined public faith in the energy industry, in government regulators, and even in our ability of a nation to respond to crises.
- This should never happen again
- The goal is achievable if the American people, their government, and the offshore oil and gas industry choose to make it so.