Advancing Global Deepwater Capabilities

bp

BP's Commitment

The Deepwater Horizon incident was a tragic accident that took 11 lives and impacted thousands of people and the Gulf environment

Going forward, we are

- **Determined to accelerate and further develop the capabilities and practices** that enhance safety in our company and the deepwater industry
- **Committed to sharing our learnings globally** so an incident of this magnitude never happens again

BP's Experience from the Incident and Numerous Investigations Inform Our Learnings

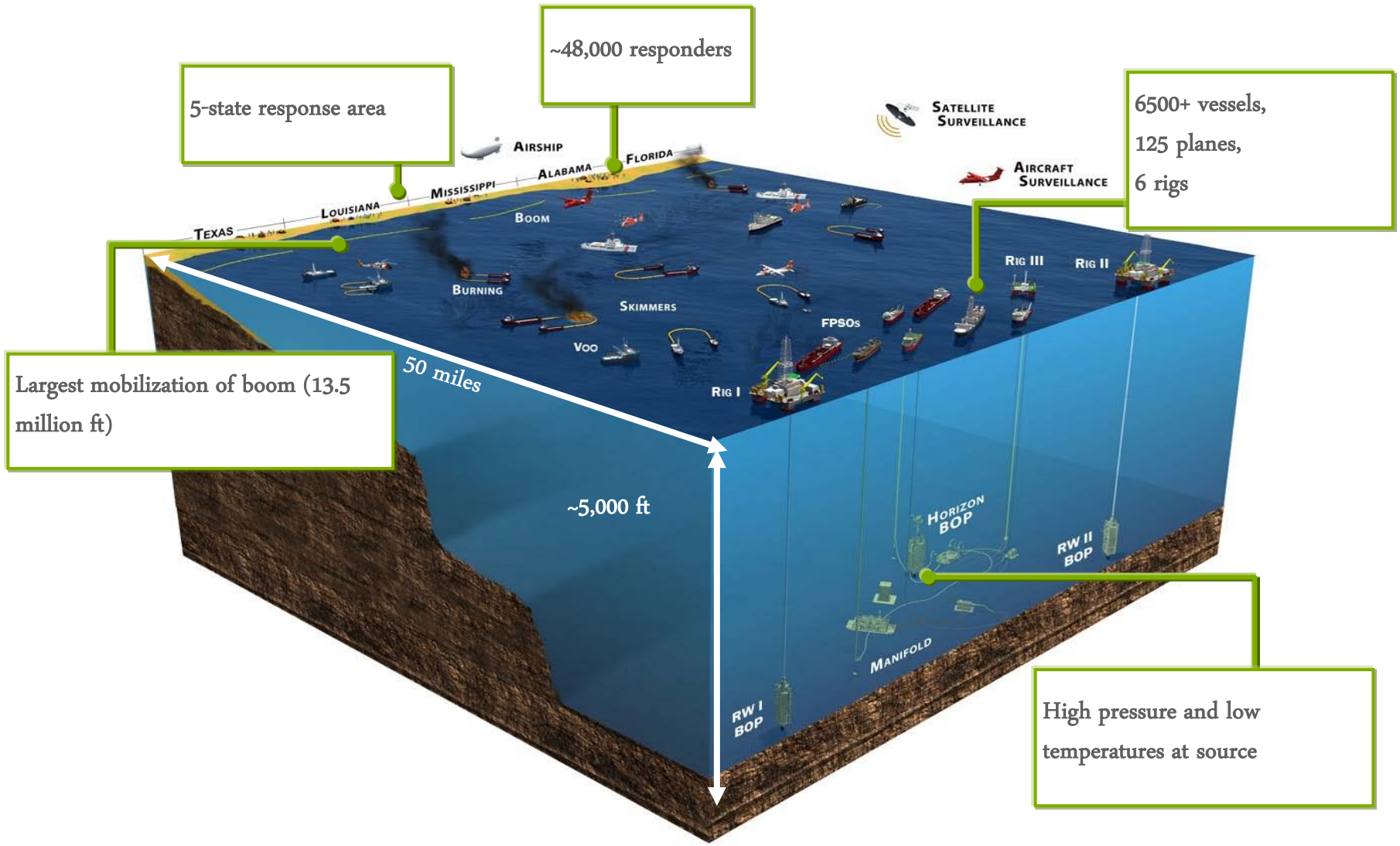
Lessons Learned

Learnings from Deepwater Horizon incident and response

- **BP internal investigation**
- **Presidential Commission investigation**

- Deepwater Horizon Joint Investigation (BOEM & USCG)
- US Chemical Safety Board
- National Academy of Engineers
- Montara Commission
- European Commission on Offshore Safety
- API Task Forces

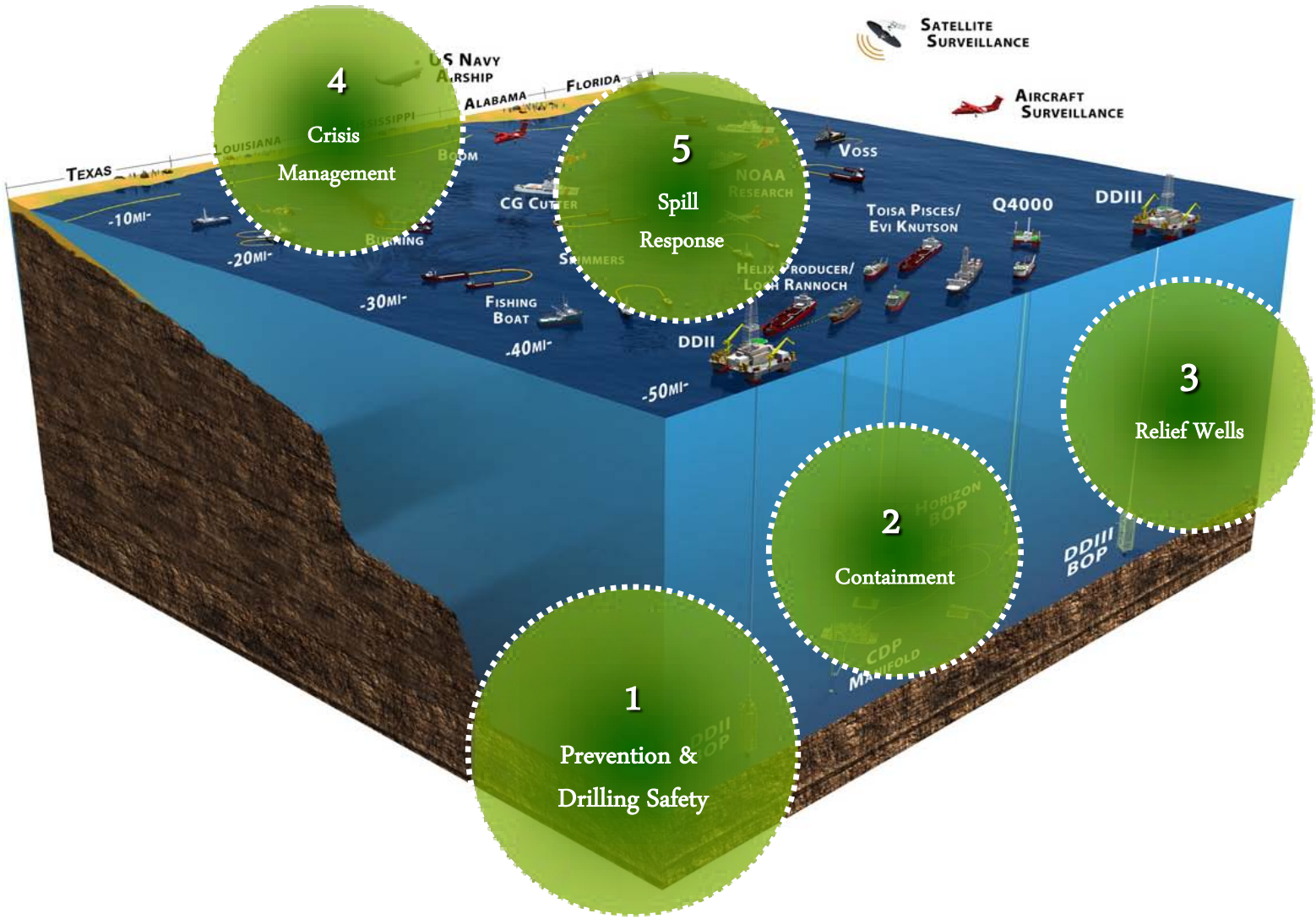
Unprecedented Scale of Response in Challenging Conditions

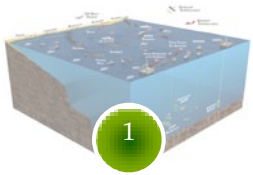


The current situation – March 2011

- **MC252 well capped and oil flow stopped 15th July: Relief well drilling continued**
- **Well killed 19th September: Confirmed by the Unified Area Command & BP**
- **Status (from DWH GCIMT 23 Mar):**
  - 2600 people still mobilized and deployed
  - 220 vessels
  - 1,000 Other Equipment e.g. vehicles, heavy equipment, trucks, beach machines, etc..
- **Additional Response Facts:**
  - 4.9 million barrels of oil discharged (estimate by NOAA and USGS on 2 August 2010)
  - 1.8 million gallons of dispersants used
  - Over 400 in-situ burns conducted (265,450 barrels of oil burned)
  - 1.4 million barrels of liquid waste collected
  - 92 tons of solid waste collected

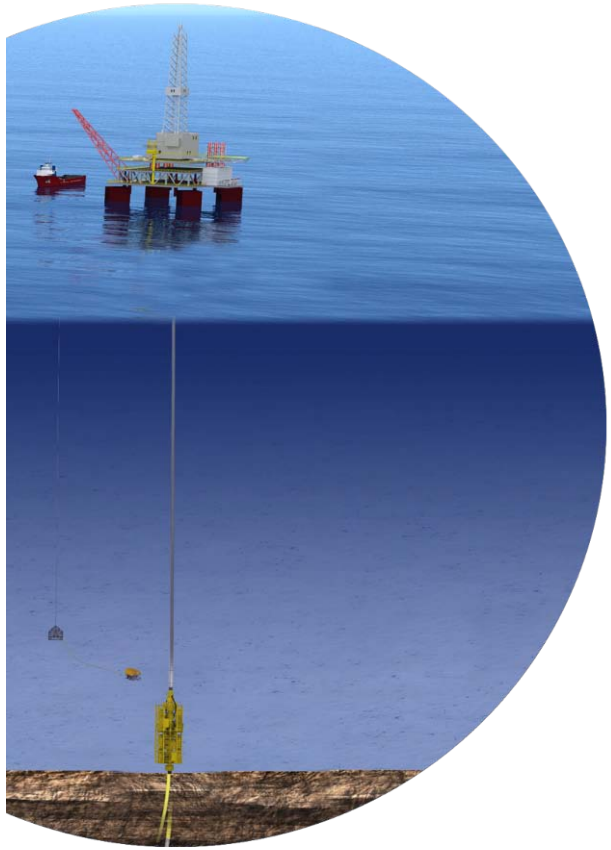
BP Acquired Unique Knowledge and Experience Across Five Key Areas





Prevention / Drilling Safety

The Highest Priority

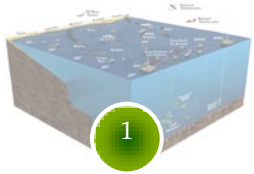


Equipment and Procedures

- Enhancing global standards for BOPs, cementing, well integrity testing, and rig audits
- Establishing rigorous well checks
- Reviewing contractor oversight relating to safety

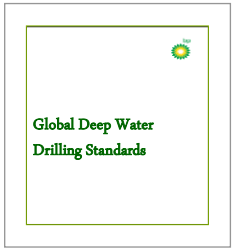
Top to Bottom Focus on Safety and Risk Management

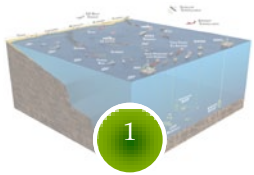
- Additions to BP's board
- Empowering centralized Safety and Operational Risk group
- Creating centralized Global Wells Organization to drive standardization and consistent implementation
- Reviewing employee compensation to ensure safety-first behavior is appropriately incentivized



Prevention / Drilling Safety

Embedding Critical Recommendations

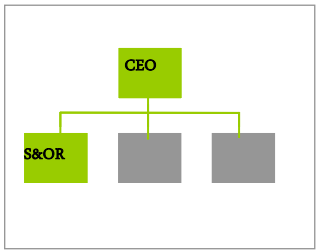
Critical Capabilities	Advance and Embed
 **Procedures and Technical Practices**	■ Refreshing drilling and well operating engineering technical practices ■ Ensuring conformance to these practices
 **BOP Management**	■ Third party verification of BOP maintenance and testing now required ■ ROVs capability tested subsea to confirm BOP activation in emergency situations
 **Cementing Services Oversight**	■ New standards and technical review process developed for critical cementing operations ■ More stringent contractor laboratory quality audits



Prevention / Drilling Safety

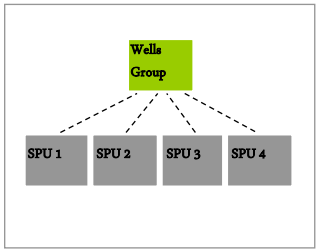
Key Priorities to Further Improve Safety

Critical Capabilities	Advance and Embed



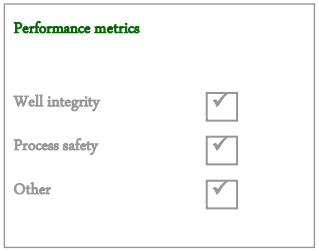
Dedicated Safety & Operational Risk organization

- Drive process safety improvements and strengthen management of operational risk



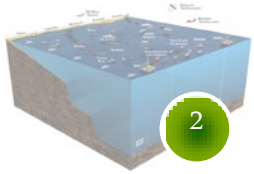
Centralized global wells organization

- Implement consistent global drilling standards
- Elevated technical approvals to increase visibility of risk



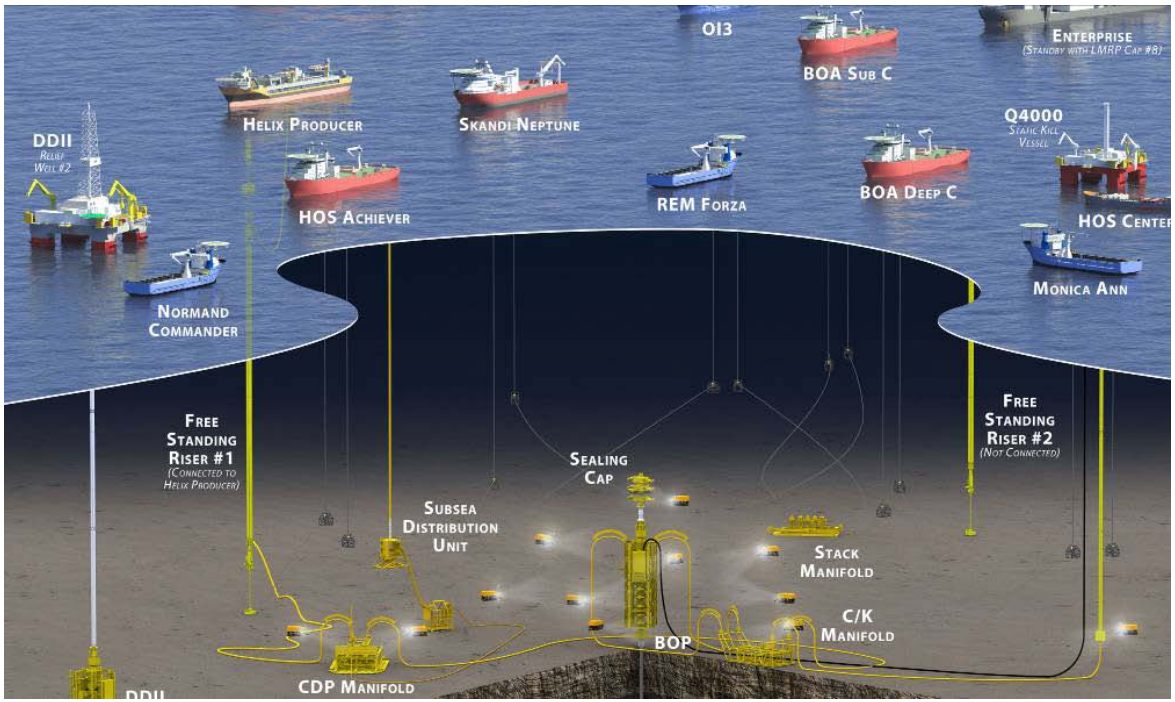
Enhanced process **safety** through **performance management**

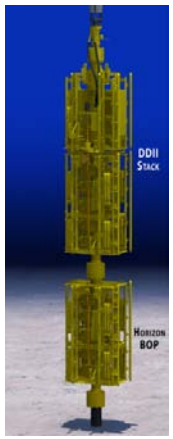
- Increased focus on well integrity and process safety as performance metrics
- Ensure compensation aligned with corporate safety goals



Containment

Proven, Innovative Systems





Capping

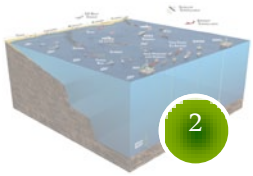
- Capping stack
- BOP on BOP

Collection

- Free standing risers & collection vessels (e.g. FPSO)
- ~15 different collection devices

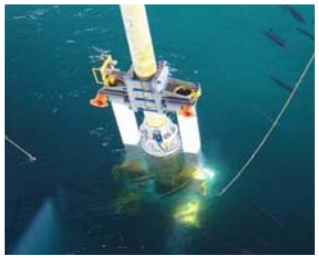
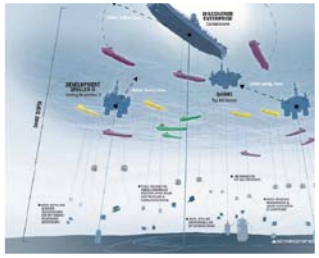
Surveillance, monitoring and operations

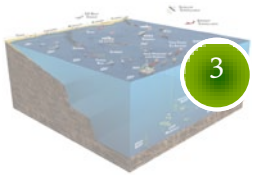
- 50 surface vessels/16 ROVs
- Seismic surveys, acoustic monitoring, temperature and pressure monitoring
- 4D SimOps co-ordination



Containment

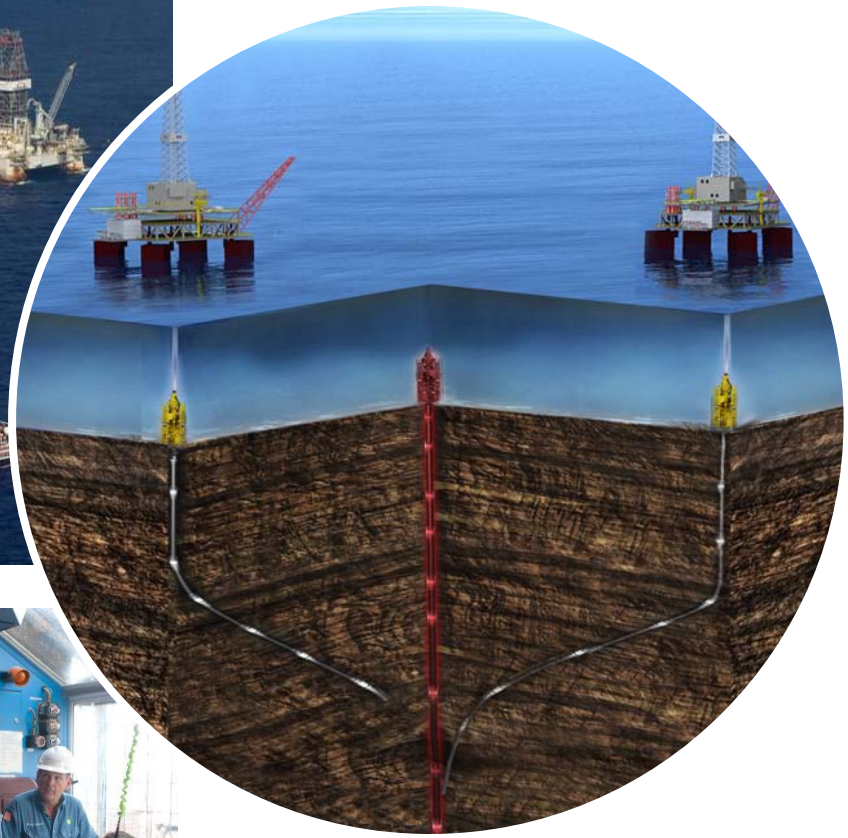
Advancing Solutions for the Industry

Critical Capabilities	Advance and Embed
 **Immediate access to capping equipment** for multiple scenarios	▪ Developing and making next generation solutions ready for deployment ▪ Optimizing global equipment positioning
 **Rapidly-deployable collection system**	▪ Working with industry organizations to provide access to permanent free standing riser system for global deepwater basins
 Large scale **simultaneous operations management**	▪ Codifying protocols to manage subsea ops within small area ▪ Extending 4D capability for day-to-day operations to plan and monitor surface and sub-sea activity



Relief Wells

Rapid Intersect and Bottom Well Kill

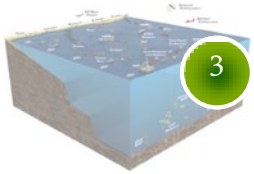


Planning & Drilling

- Well spud within 12 days of incident enabled by rig and equipment availability
- Engaged industry expertise for efficient drilling operations

Intersecting

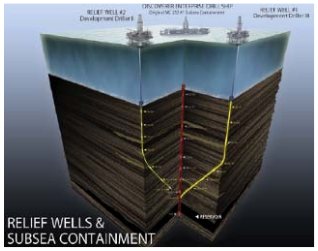
- Intersected on first attempt
- Utilized existing ranging technology while simultaneously developing early stage real time ranging technology



Relief Wells

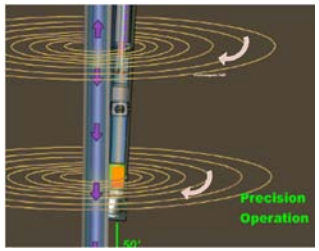
Preplanning and Technology to Accelerate Bottom Well Kill

Critical Capabilities	Advance and Embed



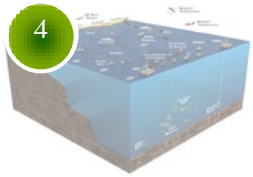
Immediate access to rigs and related equipment

- New guidelines for relief well contingency planning issued
- Developing BP rules, that access to relief well rigs and equipment must be secured prior to new well drilling



Real time ranging technology

- Joint effort to complete development of real time ranging technologies that can cut drilling time by up to 40%



Crisis Management

Demonstrated at Scale

Central organization

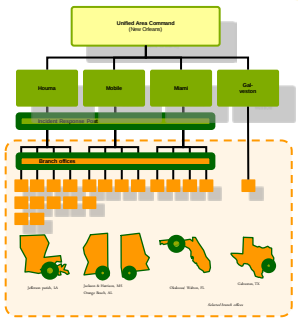
- Incident Command Structure (ICS) activated quickly
- Scaled organization to ~48,000 responders

Local organization

- Branch network across 19 sites to engage local stakeholders

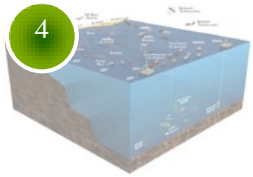
Technology

- State-of-the-art platform to enable integrated 3D view of response



Community

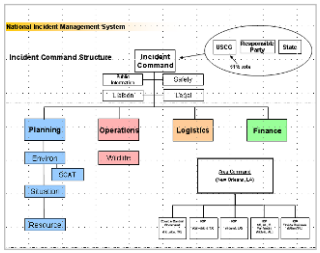
- Coordination of town halls, community outreach and claim centers
- Trained local pool of responders



Crisis Management

Extending Proven Structure and Deploying Technology

Critical Capabilities	Advance and Embed



Incident command structure (ICS) for rapidly scalable response

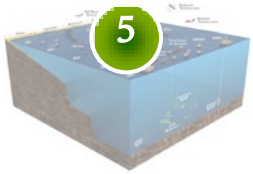
- Extending ICS principles beyond US to make it BP global standard for crisis management
- Training more functional subject matter experts for global ICS

Right balance of **central planning/ resources and local autonomy**

- Adopting proven branch structure to promote local accountability
- Formalizing strategies to give locals more voice and tap local expertise

Common operating plan and picture for rapid decision making

- Availability of multi-source, multi-site, technology platform to enable real-time 3D view of response effort



Spill Response

Largest Effort in History

Open-water

Dispersants

- Proved subsea dispersants at scale
- Targeted aerial dispersants

In-situ burning at scale

- Approximately 400 burns , 14 systems

Largest skimming response

- Enhanced offshore capability

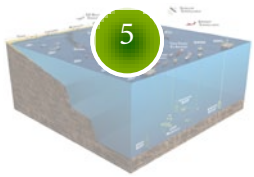
Near-shore

Broad local response

- ~3,200 Vessels of Opportunity
- 13.5 million ft of boom

Onshore

Beach cleaning technology innovations and optimization (mechanical and manual)



Spill Response

Creating the Next Generation Toolkit

Critical Capabilities	Advance and Embed

Subsea dispersant application

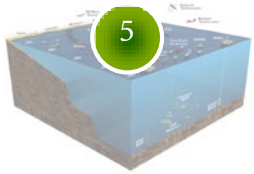
- Developing systems that improve effectiveness
- Advancing scientific knowledge of subsea use

In-situ burning at scale

- Continuing to improve fire boom technologies
- Confirmed new techniques to contain, control and direct burns

Enhanced Booming and Skimming

- Working to boost capability of response organizations around the world
- Codified procedures to optimize positioning through use of advanced surveillance resources



Statistics on Ideas Submitted

Total **123,000 individual ideas**

Subsurface well issues	80,000	
Spill Control		43,000

Within Spill Control

Ideas to potentially test		**470**	
Remediation			170
Booming, skimming, sand cleaning, mechanical, sorbents, etc.	300		
Formally evaluated or tested in Field		**100**	
Significant Use		**> 30**	

NOTE: For existing & established capabilities, PSE (Product, Services & Equipment), a separate database containing ~57,000 entries was created

Spill Response

Alternative Response Technology Effort

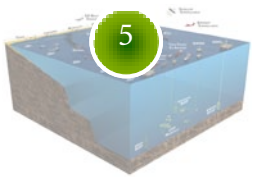
Booming, Skimming, Separation

Spill Response

Alternative Response Technology Effort

Sand Cleaning

BP Response Technology Themes



Spill Response Science

The current situation – March 2011

Summary of findings from the Response Operational Science Advisory Team (OSAT) report of 17 December 2010 which reviewed results from over 17,000 water and sediment samples http://www.restorethegulf.gov/release/2010/12/16/data-analysis-and-findings

1. No liquid phase oil identified in sediments beyond the shoreline

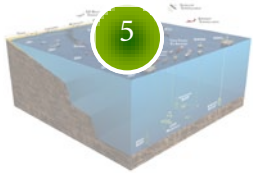
2. No exceedance of human health benchmarks nor any exceedance of dispersant benchmarks were observed

3. Since 3 August through October 2010, <1% of water samples and ~1% of sediment samples exceeded EPA's Aquatic Life benchmarks for polycyclic aromatic hydrocarbons (PAHs).

- Analysis indicated that none of the water sample exceedances were consistent with MC252 oil.
- Of the sediment exceedances, only those within 3 km of the wellhead were consistent with MC252 oil. These were associated with drilling mud.

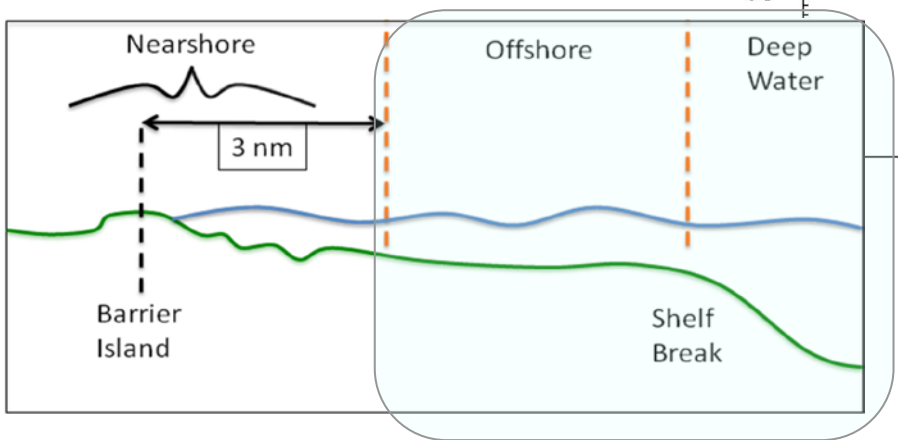
4. OSAT II findings from 10 Feb report:

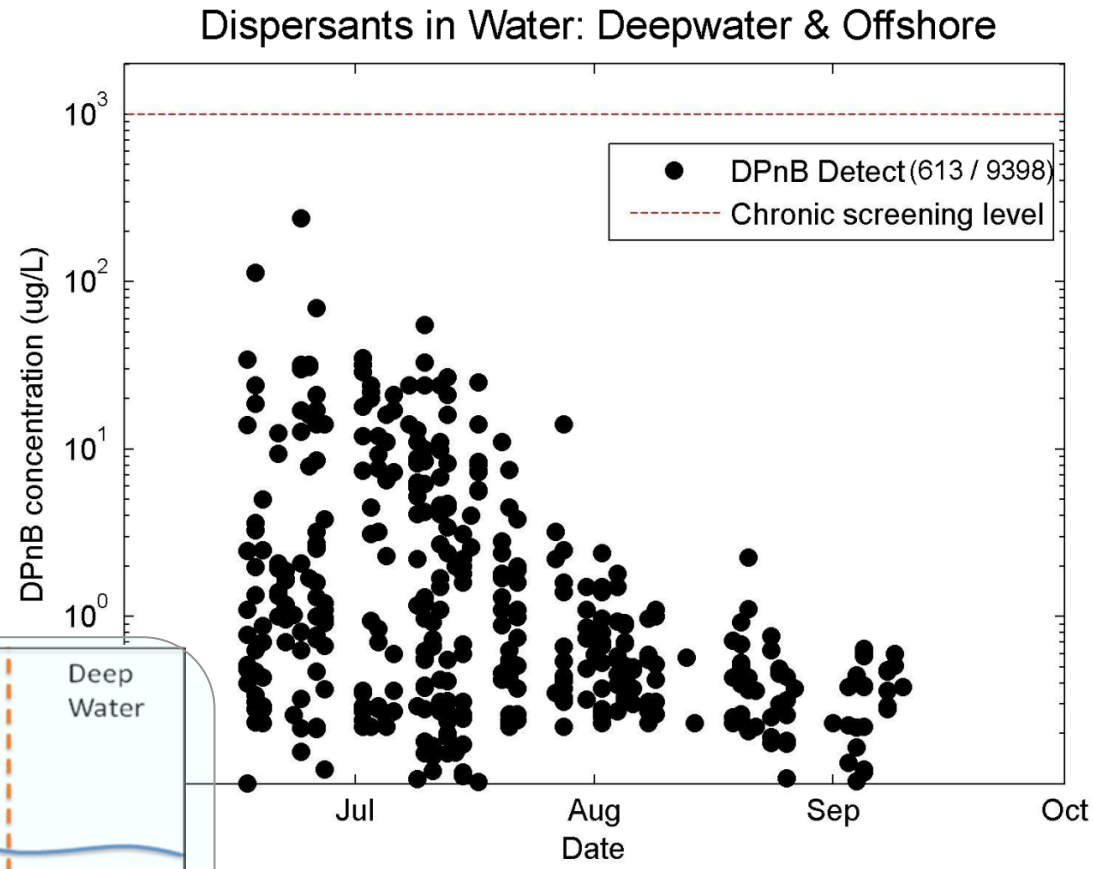
- Weathered oil (tar) samples from onshore are 86-98% depleted in PAHs
- Aquatic and wildlife resources would likely experience a greater threat from further cleanup beyond established guidelines than from the oil that still remains on the beaches.

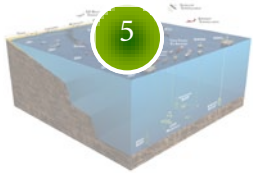


Offshore and Deep-water Sampling Zones - Dispersant Indicators

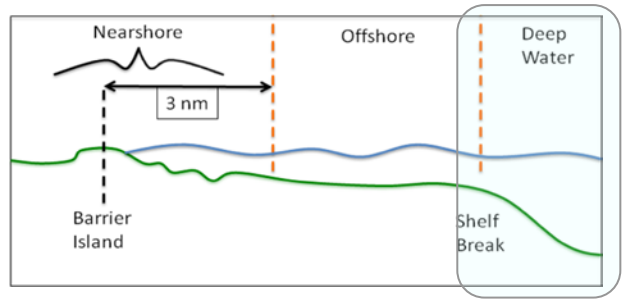
No dispersant chemical exceedances of benchmarks decreasing trend for DPnB over time







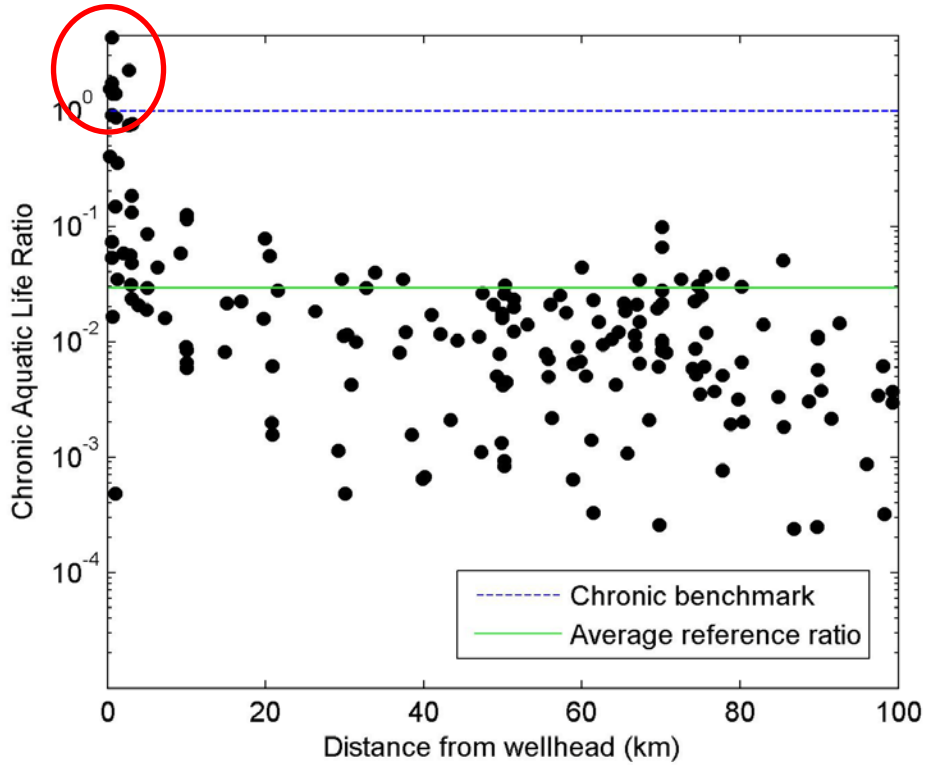
Deepwater Sampling Zone
PAH Benchmark



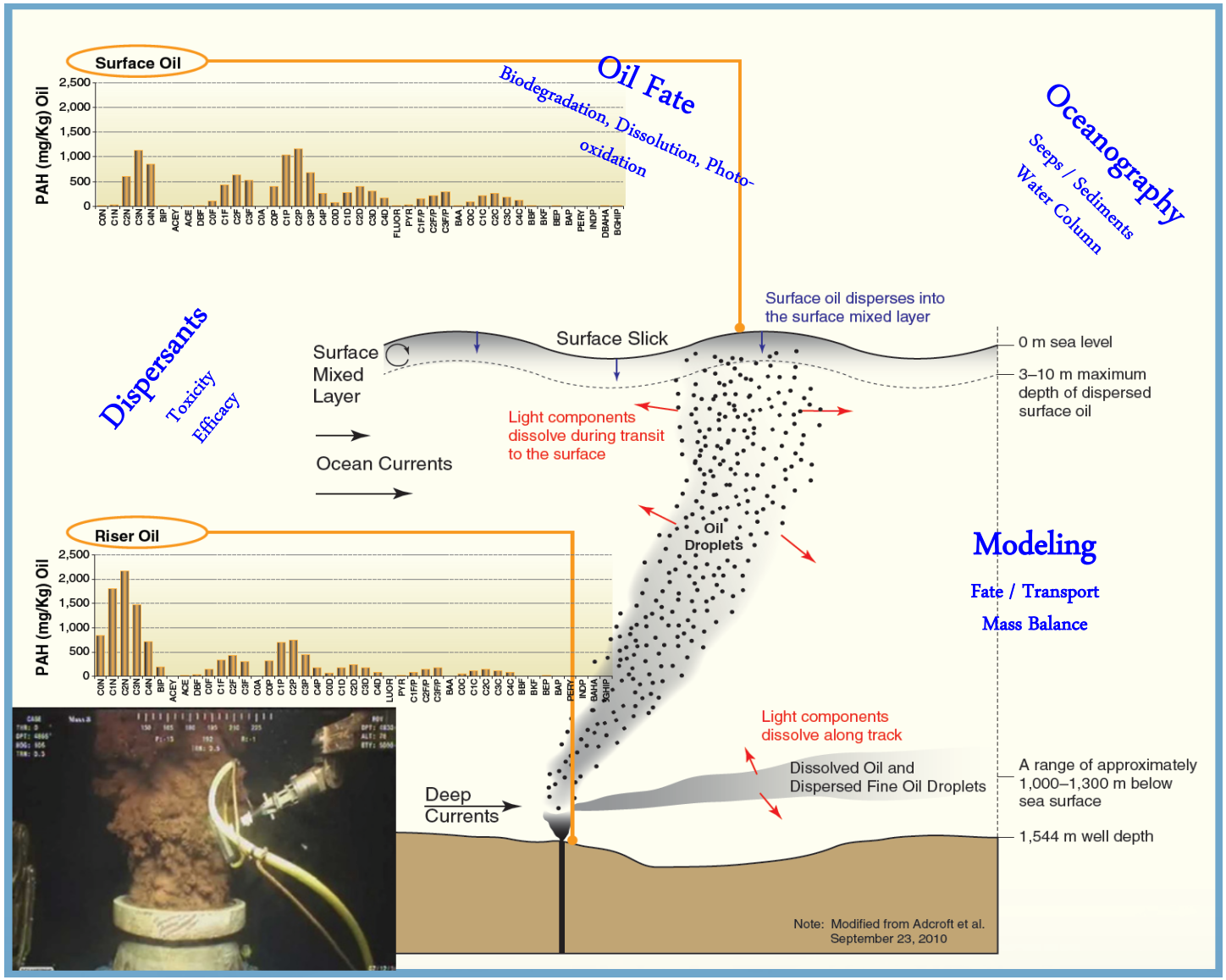
All exceedances in sediment samples consistent with MC252 oil are within ~3 km of the well head

Sediment aquatic benchmark data are similar to background reference level within ~10 km of the well

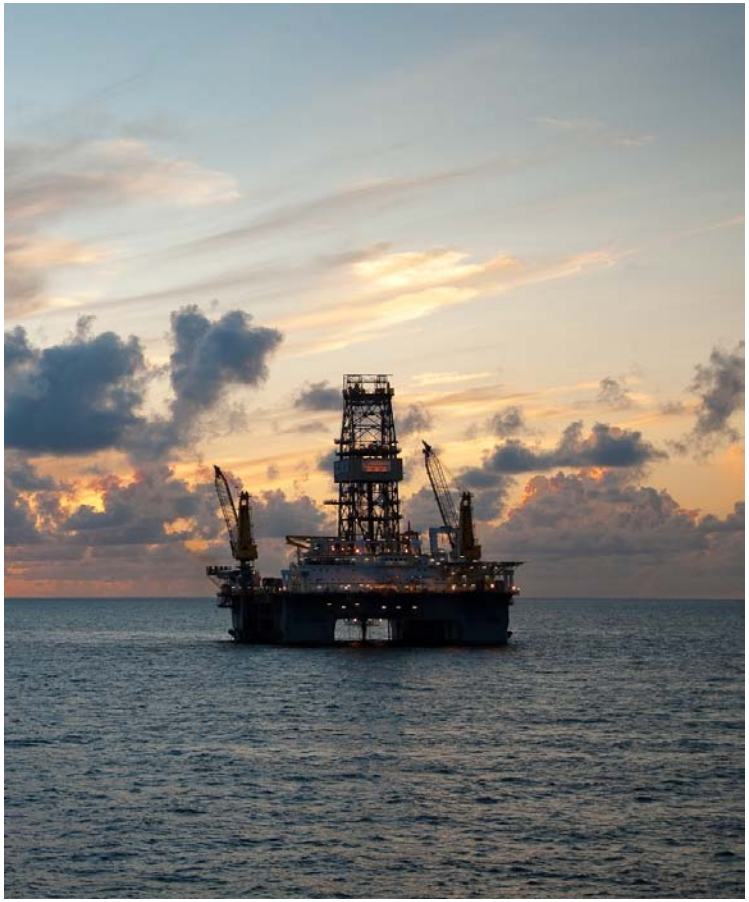
Sediment samples



BP Response Science Themes



Determined to Enhance Deepwater Safety



Continuing to develop capabilities across the 5 critical areas. Focus on

- **Technology innovation**
- **Further enhanced standards** in drilling safety
- Ensuring **inventory of response equipment** and consumables in global BP deepwater basins

Committed to Sharing our Learnings Around the World