Deepwater Gulf Infrastructure … A Reliable Proposition?

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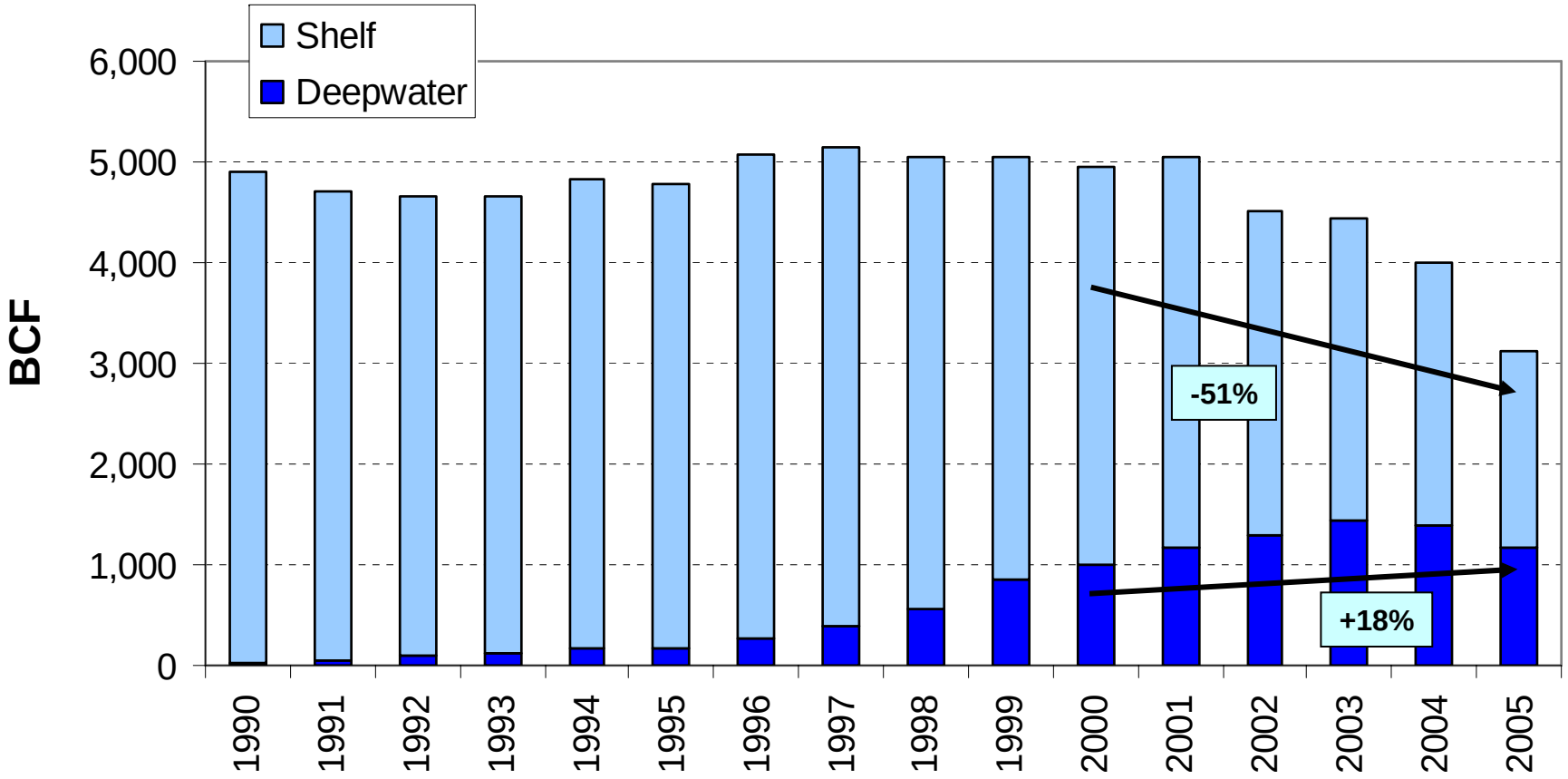
Williams

Overview of Major Sections

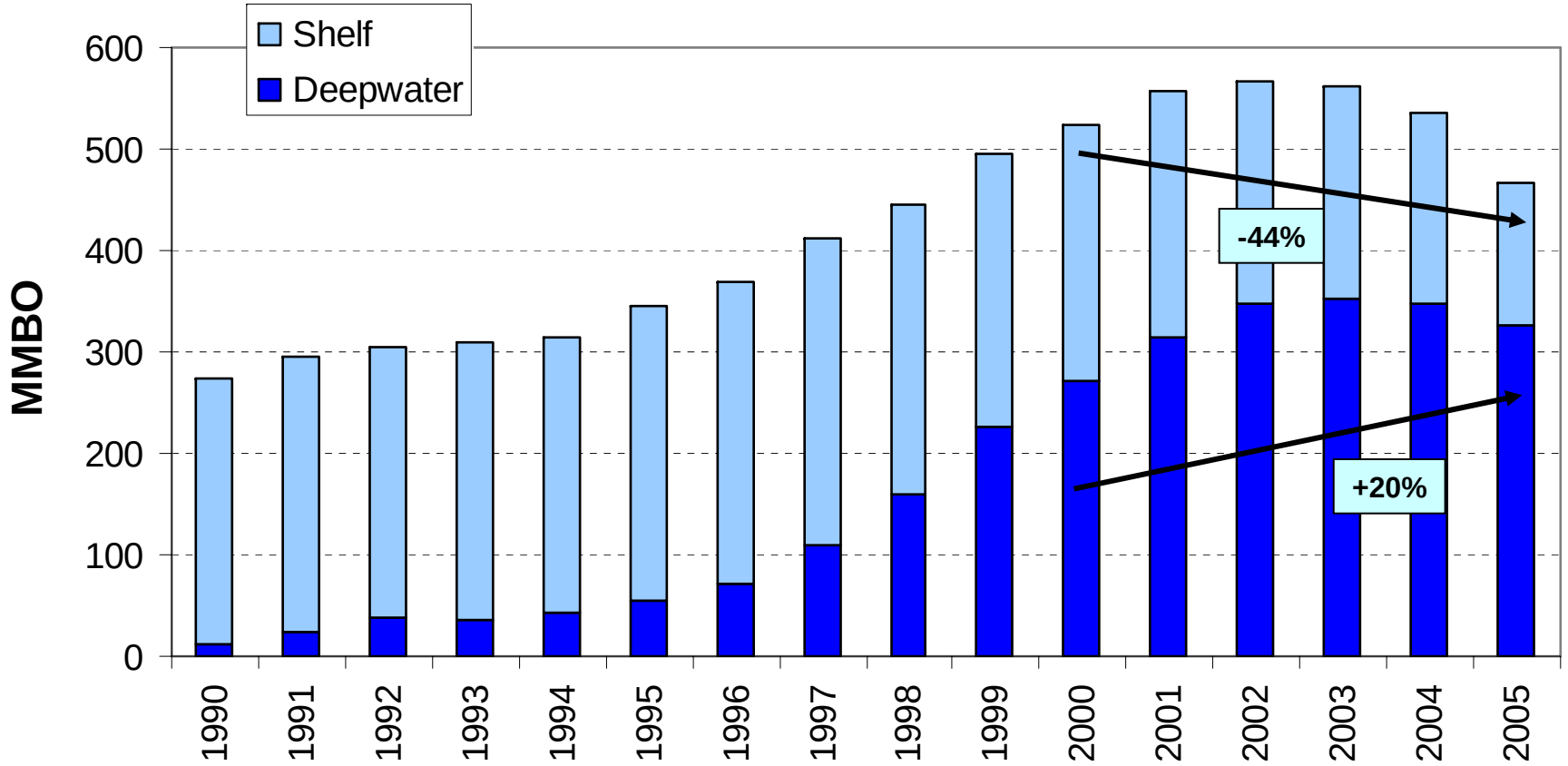
- Changing nature of Gulf production
- Deepwater aggregation theory
- Worsening weather patterns
- Deepwater pipeline architecture
- Repair, Design
- Reliability Considerations

Gulf of Mexico Annual Gas Production



*2004 – Some production lost due to Hurricane Ivan
*2005 – Significant production lost due to Hurricanes Katrina & Rita

Gulf of Mexico Annual Oil Production



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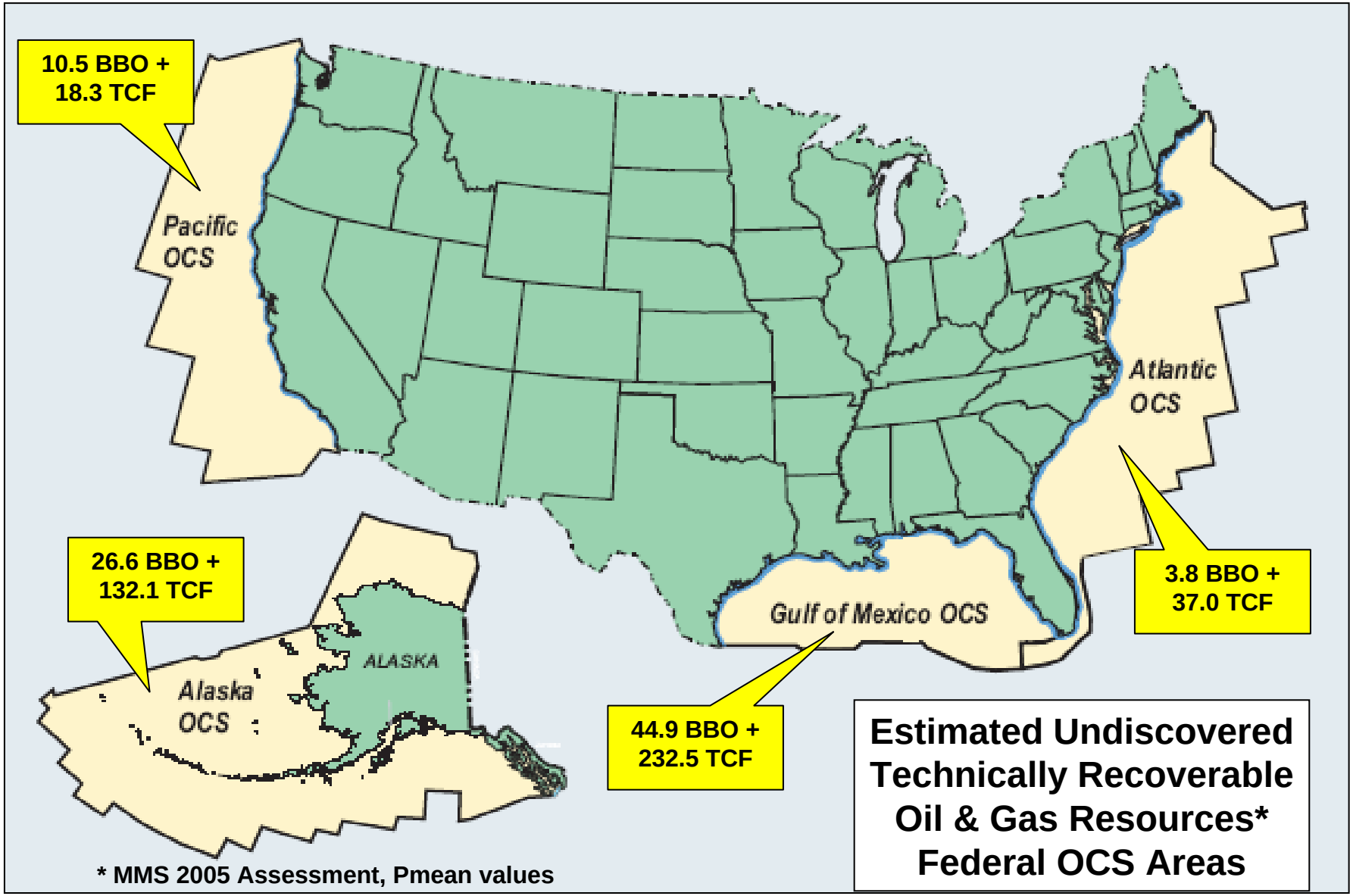
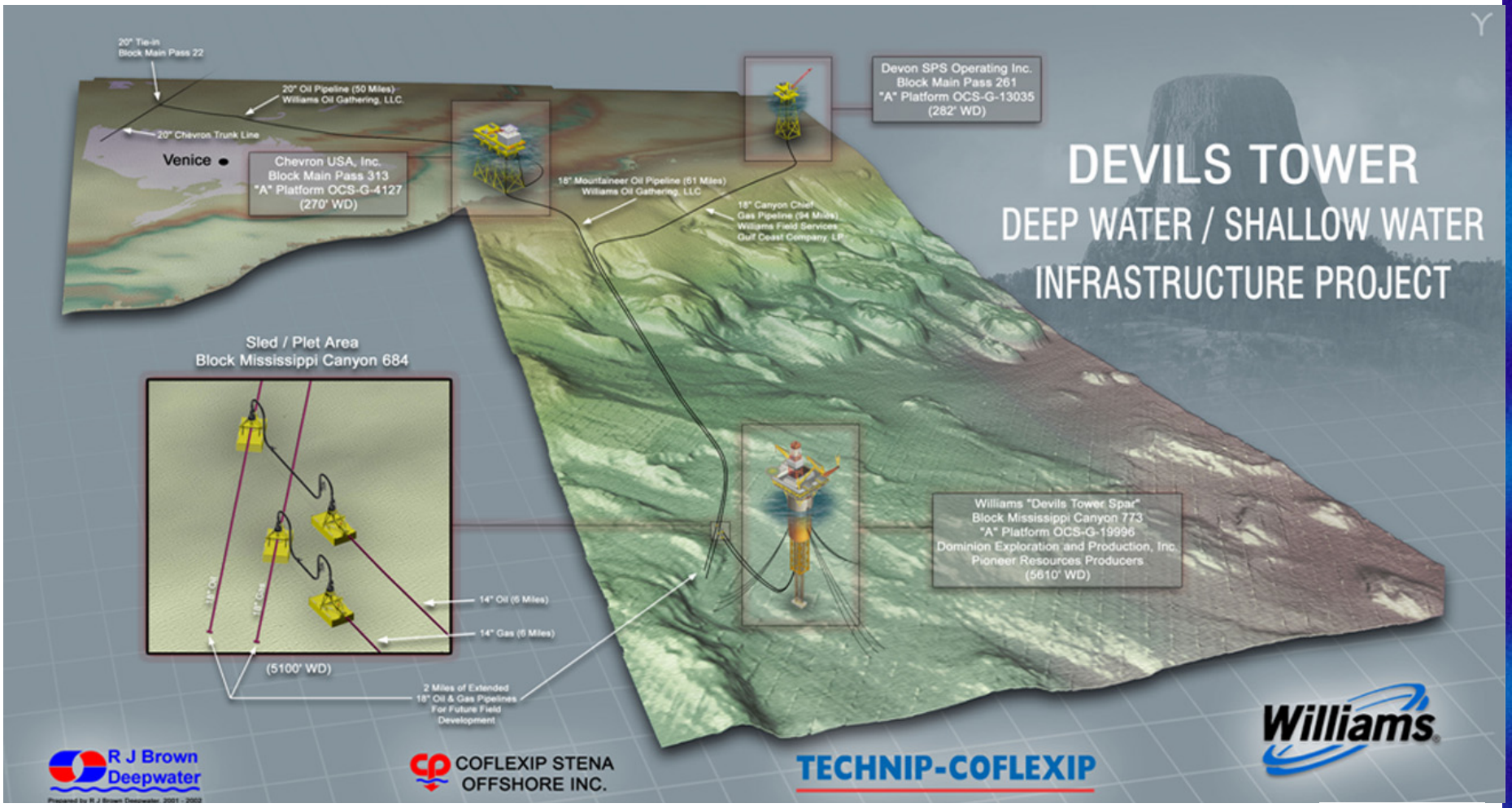
Estimated Undiscovered Oil & Gas Reserves



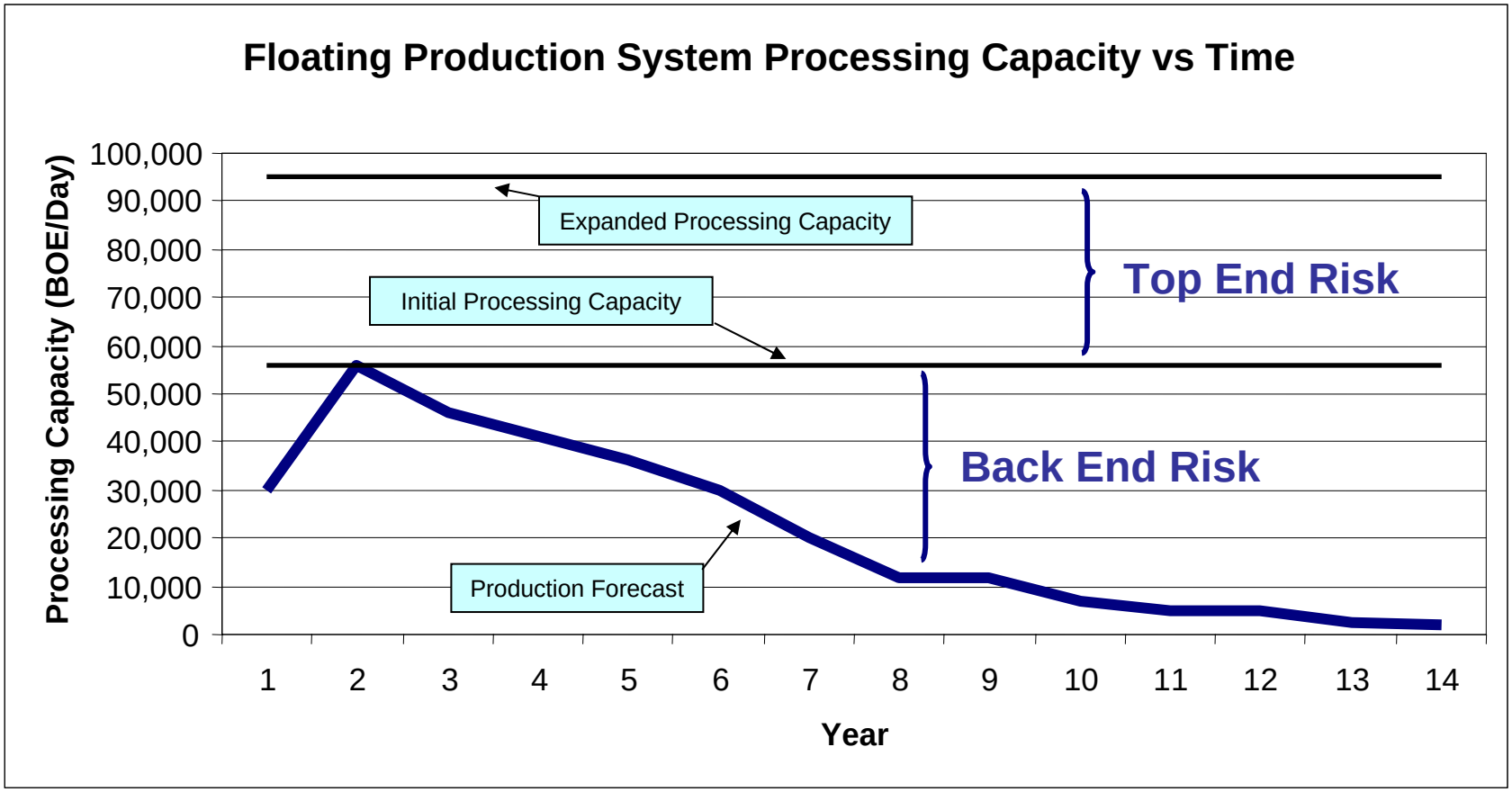
Deepwater

Gulf of Mexico – Eastern Gulf Area

The Architecture of Aggregation

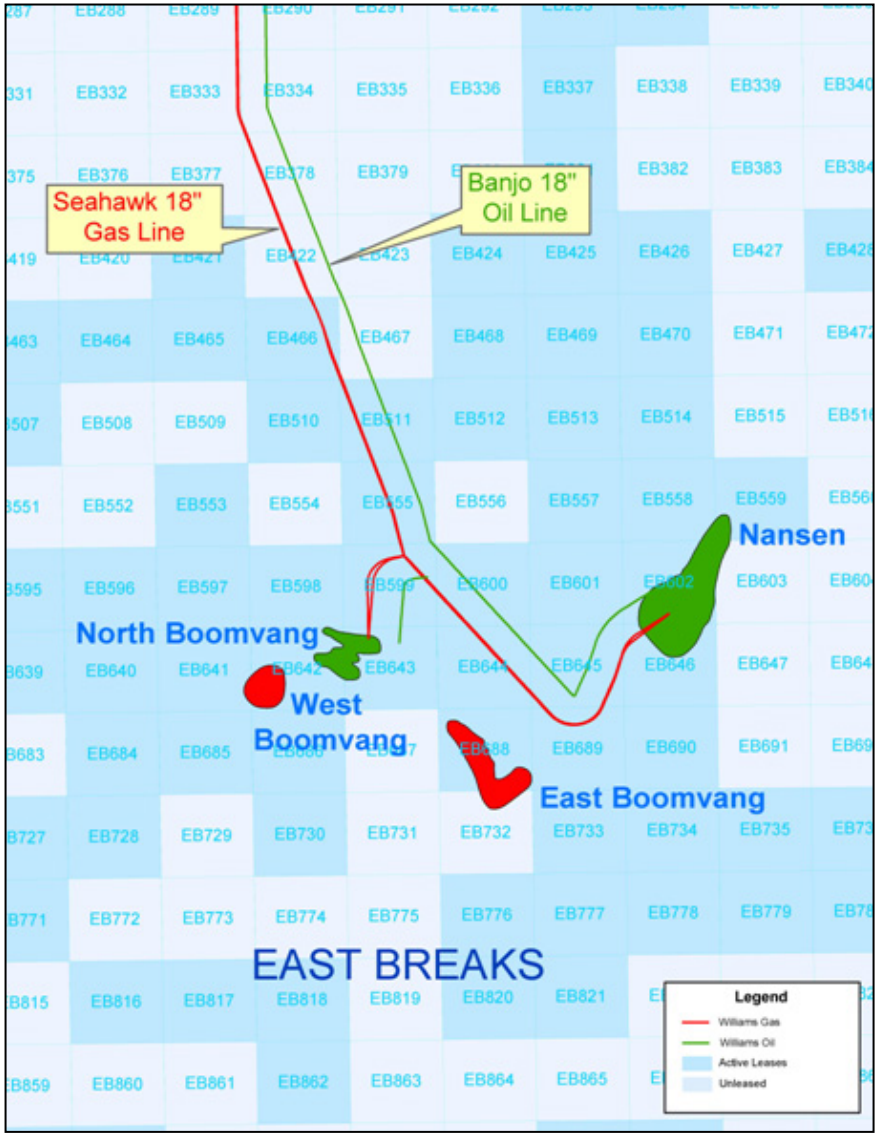


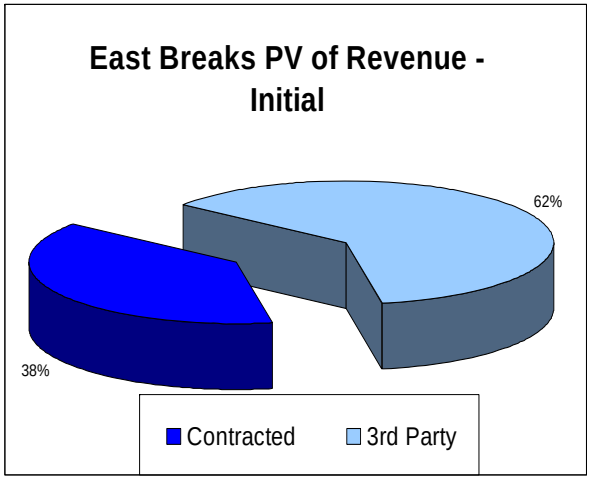
Aggregation: Reducing Risk for Everyone



- Producers toll across floating production systems and export systems
- Lower tolls due to economies of scale
- Williams assumes aggregation risks; lower than sum of individual risks
- Reduces cycle time and economic threshold for marginal prospects

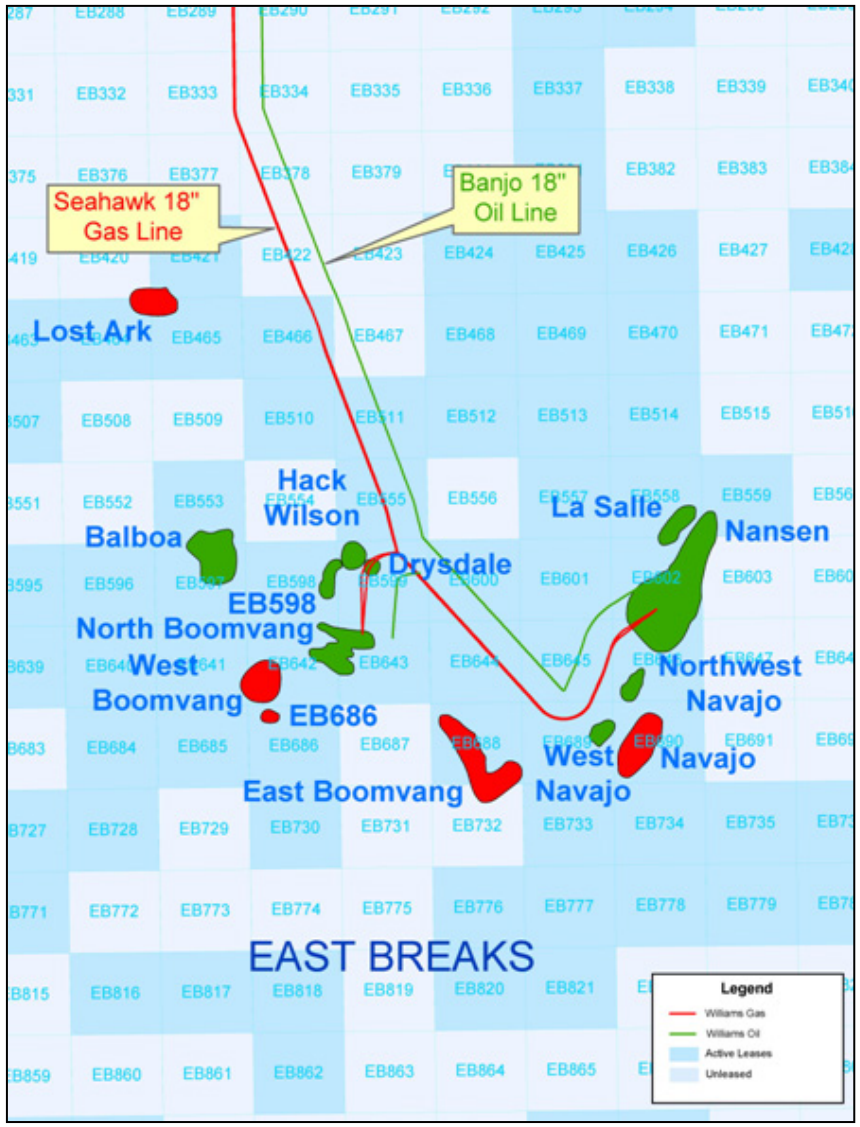
East Breaks: Initial Justification

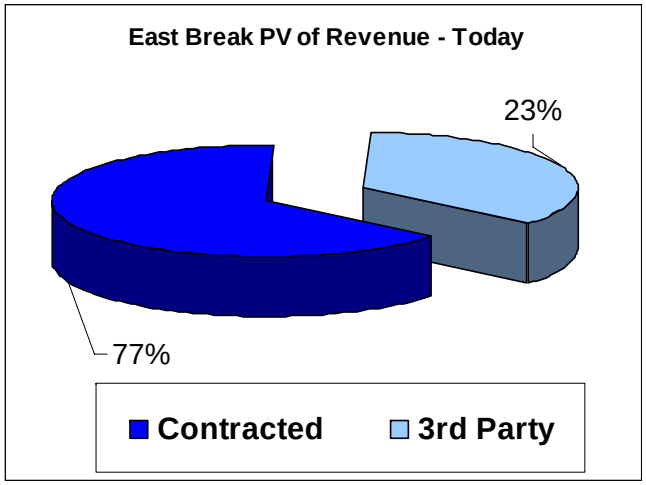




- 4 discoveries at time of sanctioning
- Original P_{50} reserves provide return of capital (to small single digit returns on capital)
- Initial justification: 1999 - 2000

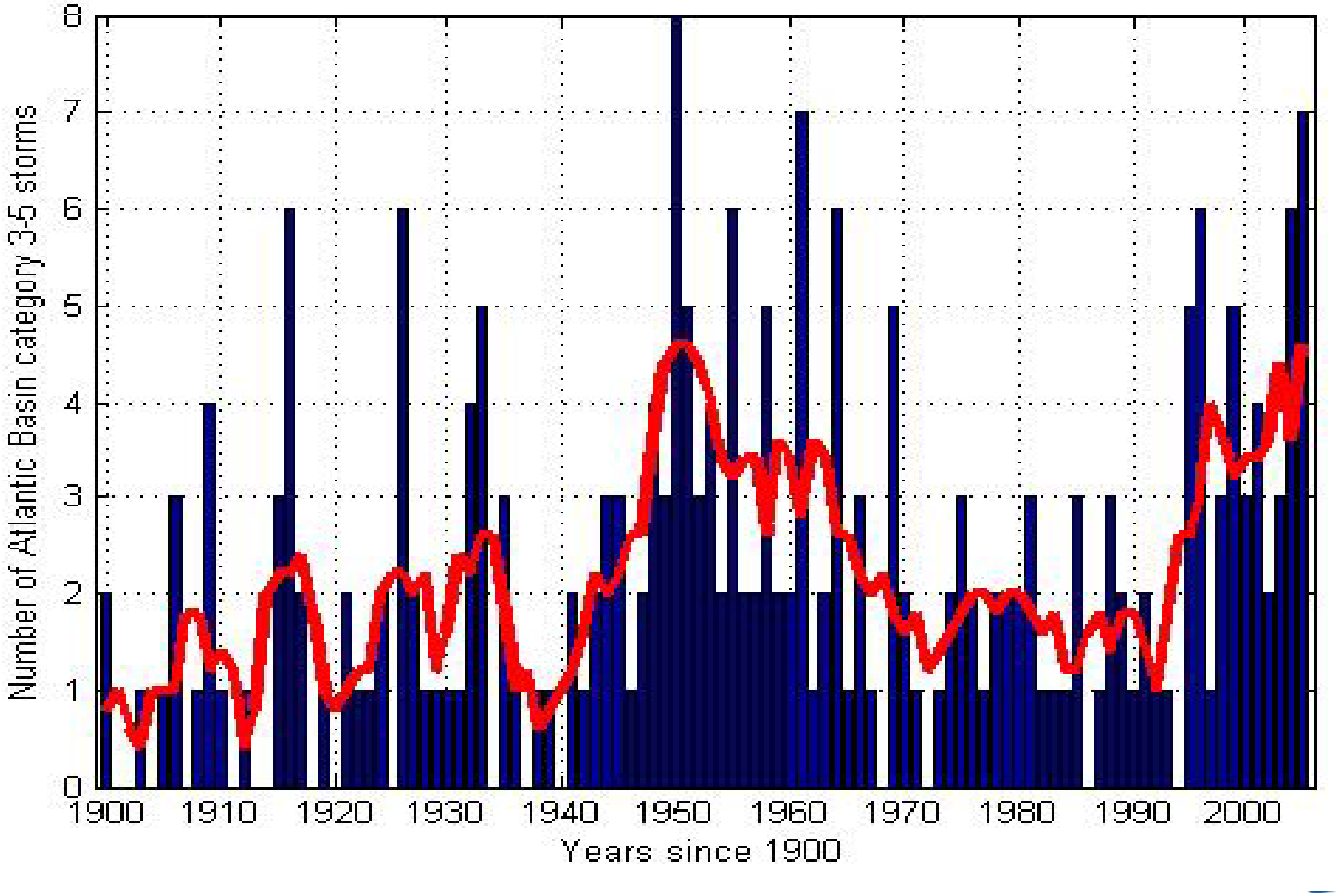
East Breaks: Today and the Future



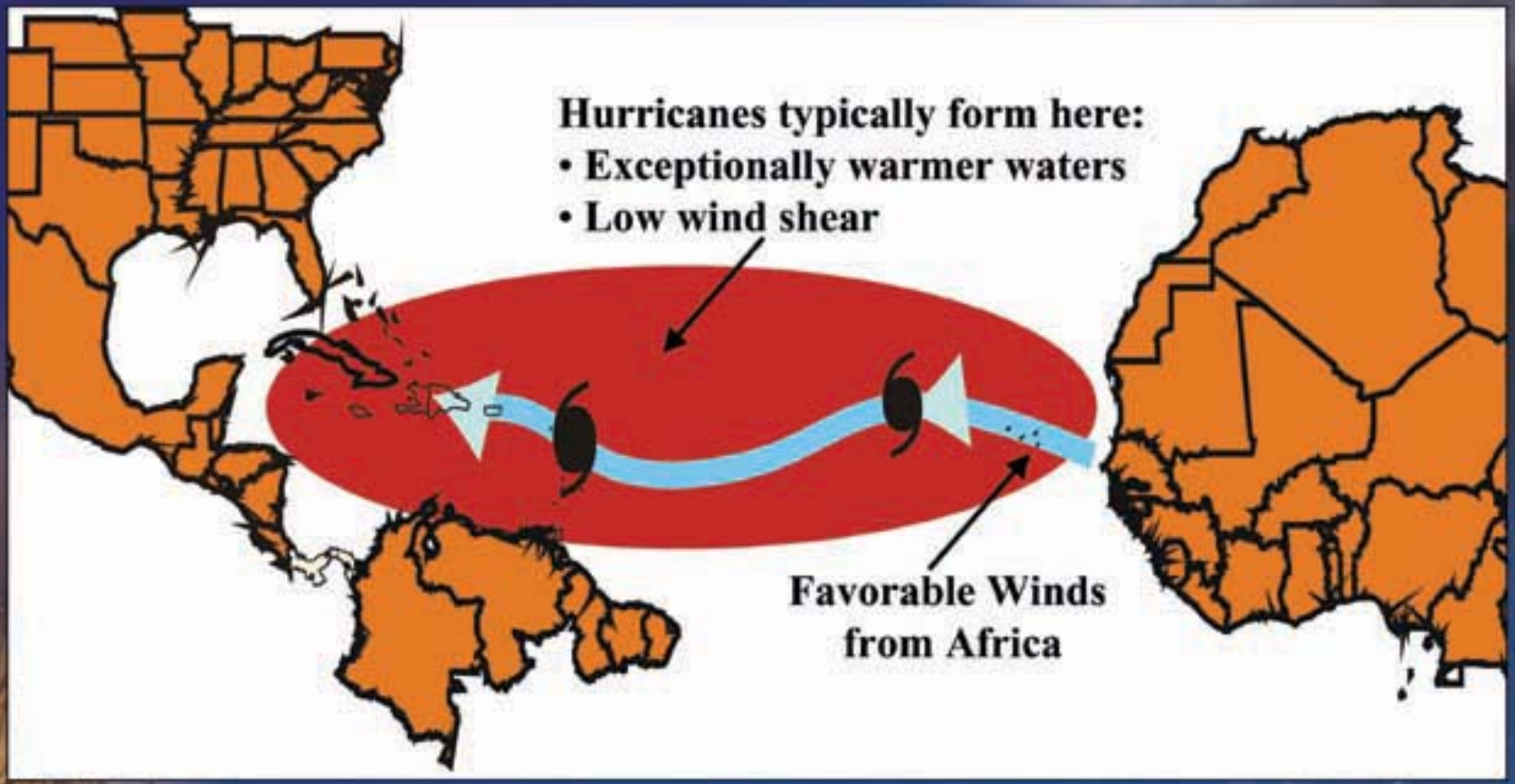


- 12 discoveries in dedicated area today
- Additional undedicated discovery in area
- 3 - 5 additional exploration wells planned next year
- Pipeline well situated for Alaminos Canyon development
- Earning a return in excess of cost of capital

Cyclical Hurricane Trend?



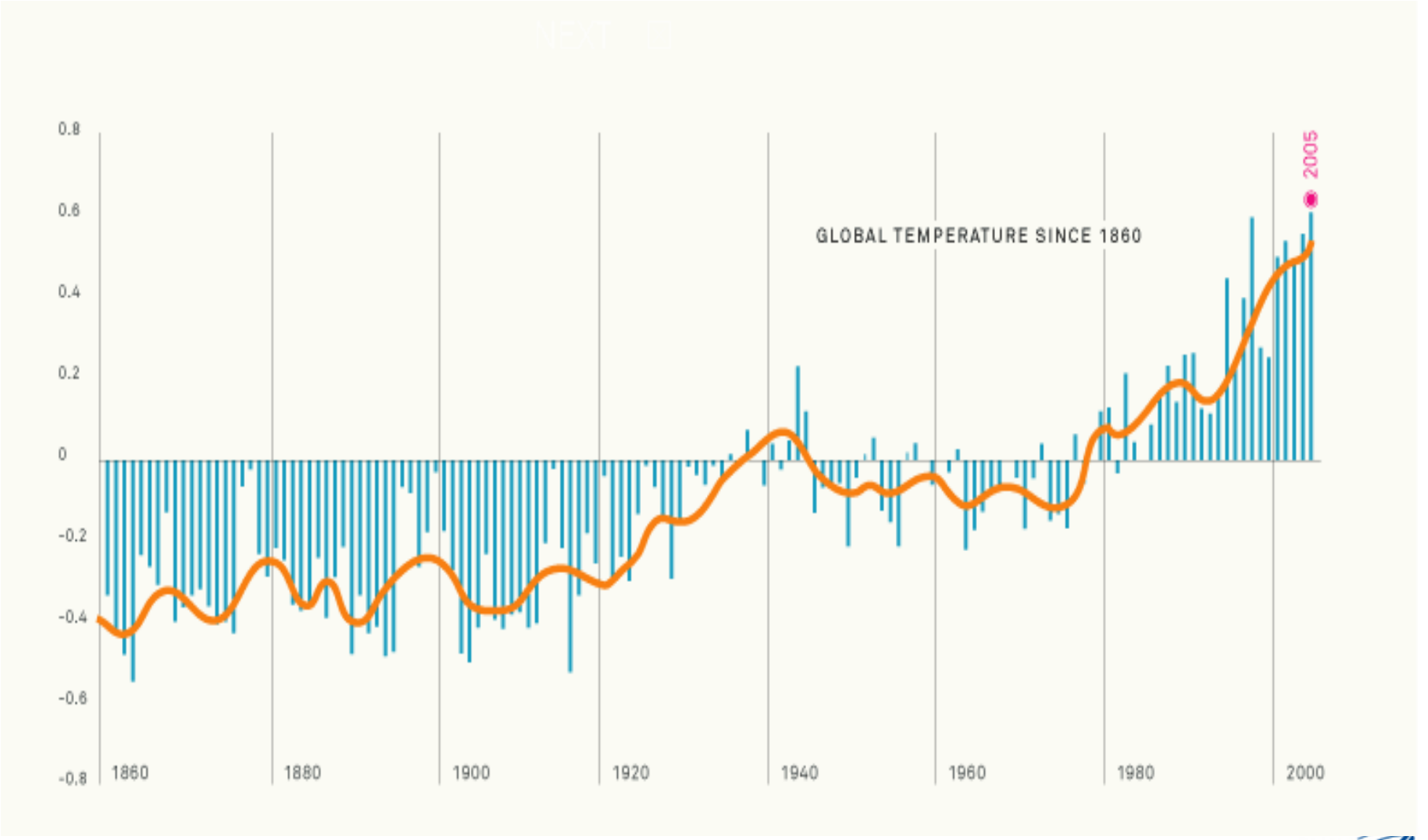
Conditions During 1995 - 2005



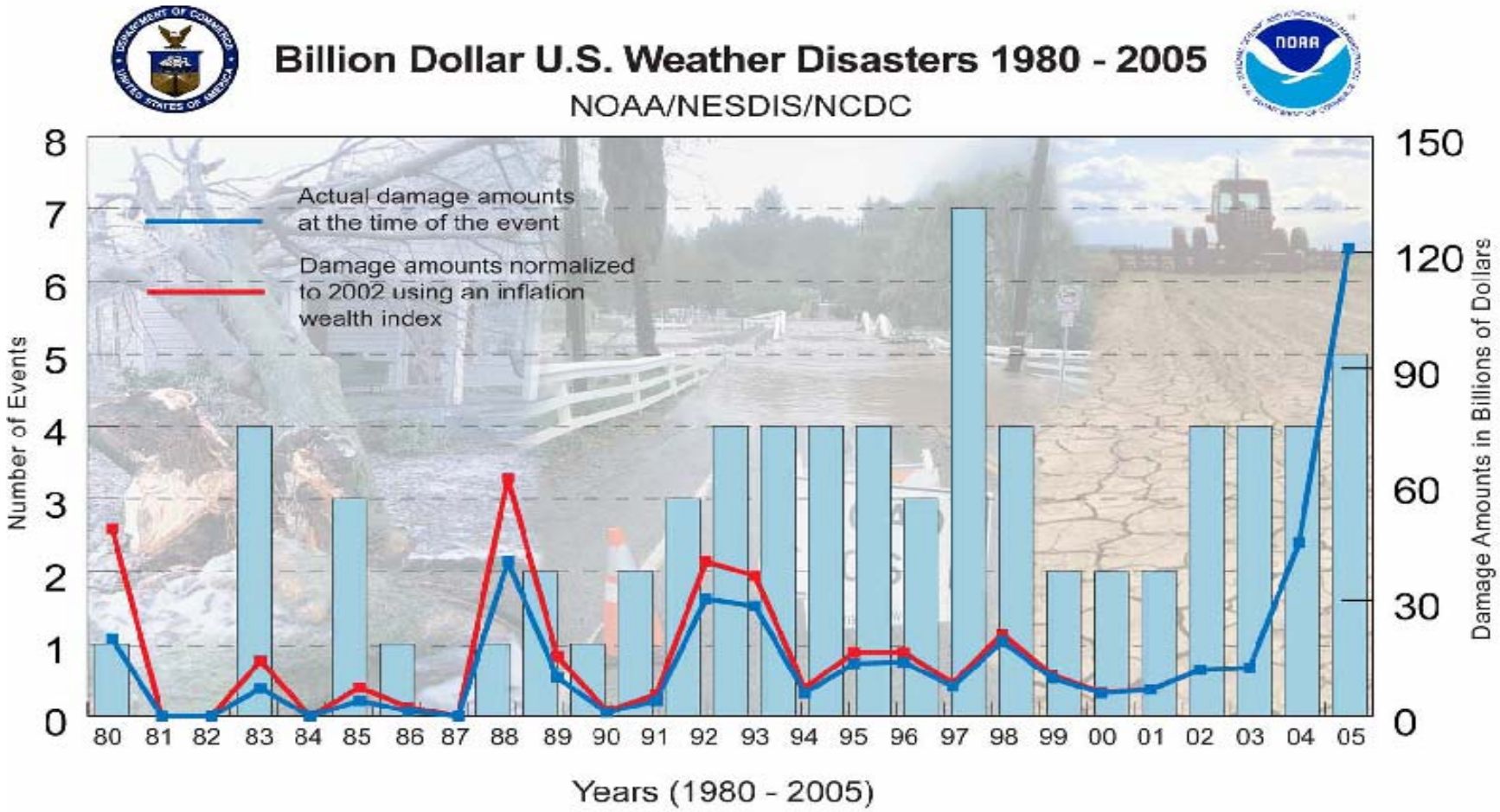
Tropical Atlantic conditions have been in place since 1995. Accurate predictions of these conditions result in highly confident NOAA seasonal hurricane outlooks.

Deepwater

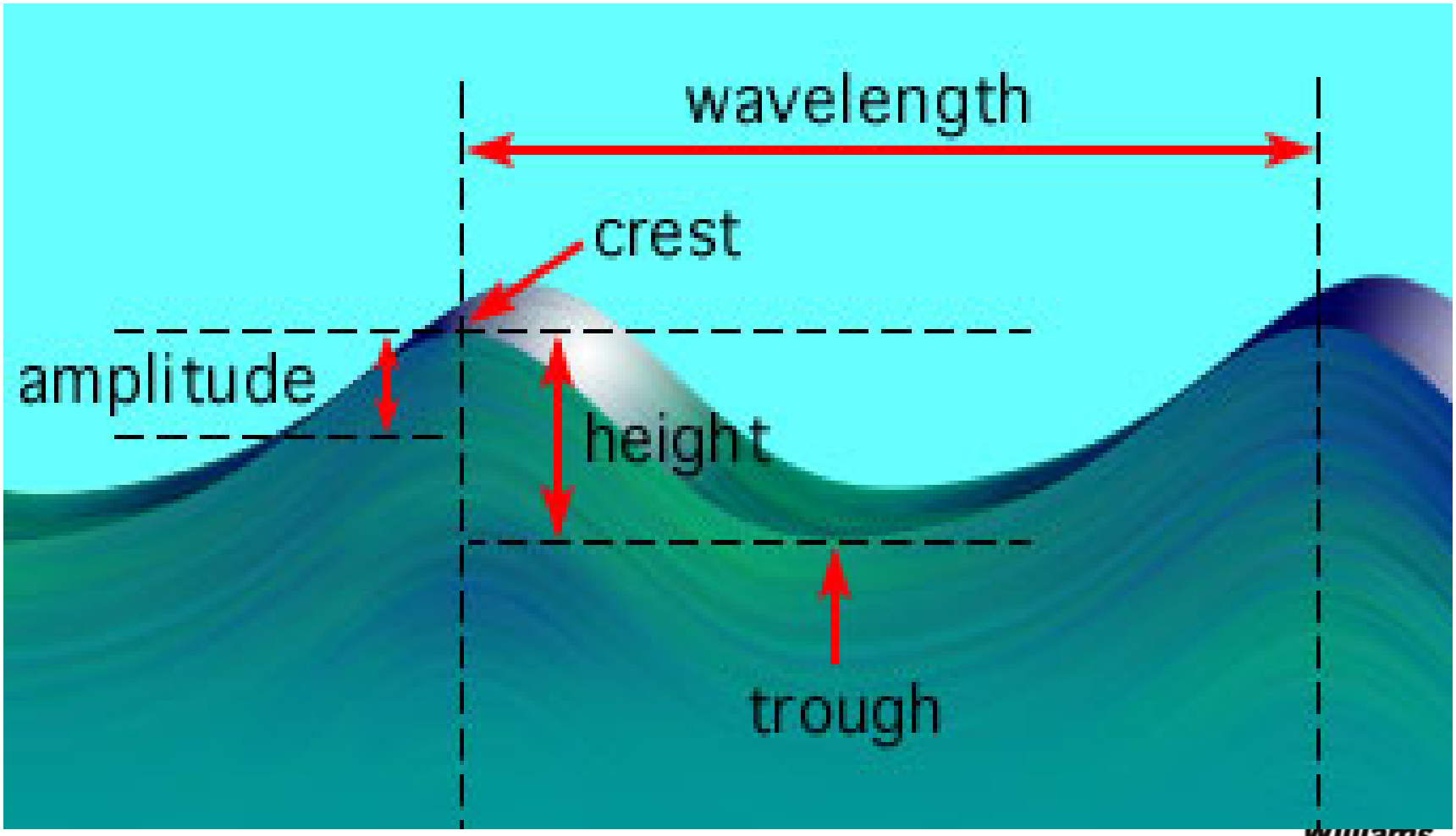
Global Temperature Trend



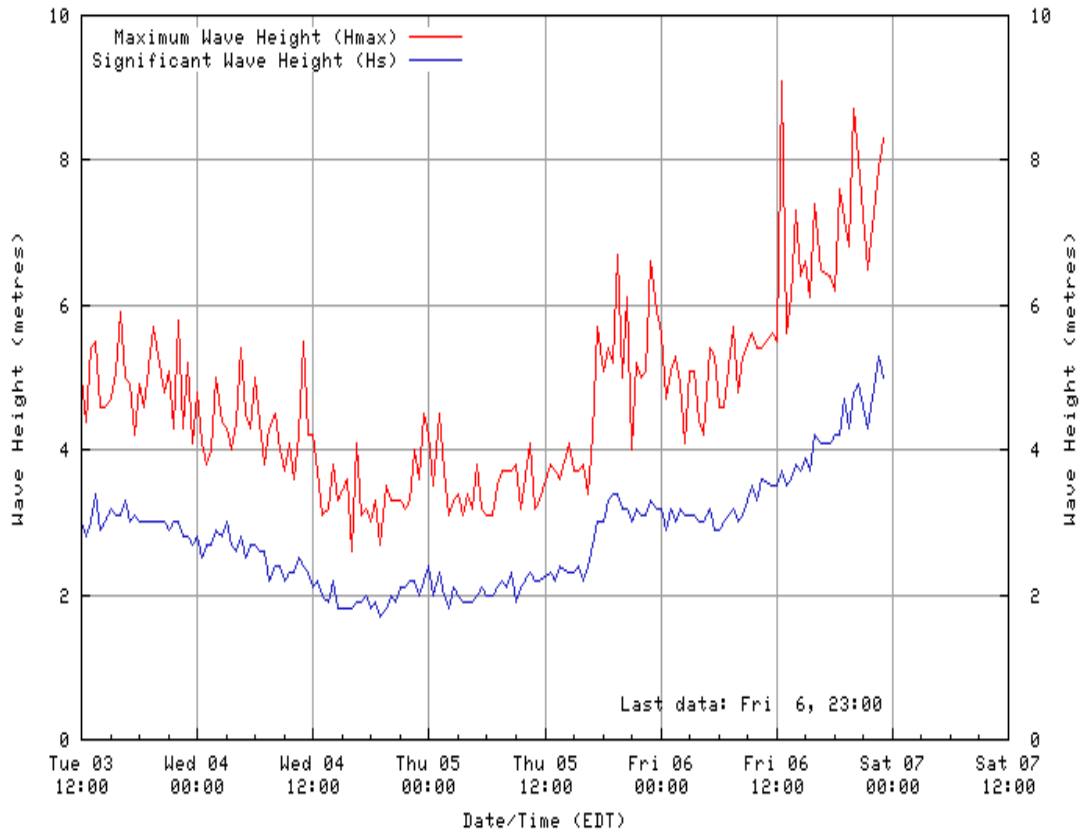
Recent Severe Weather



Wave Vocabulary

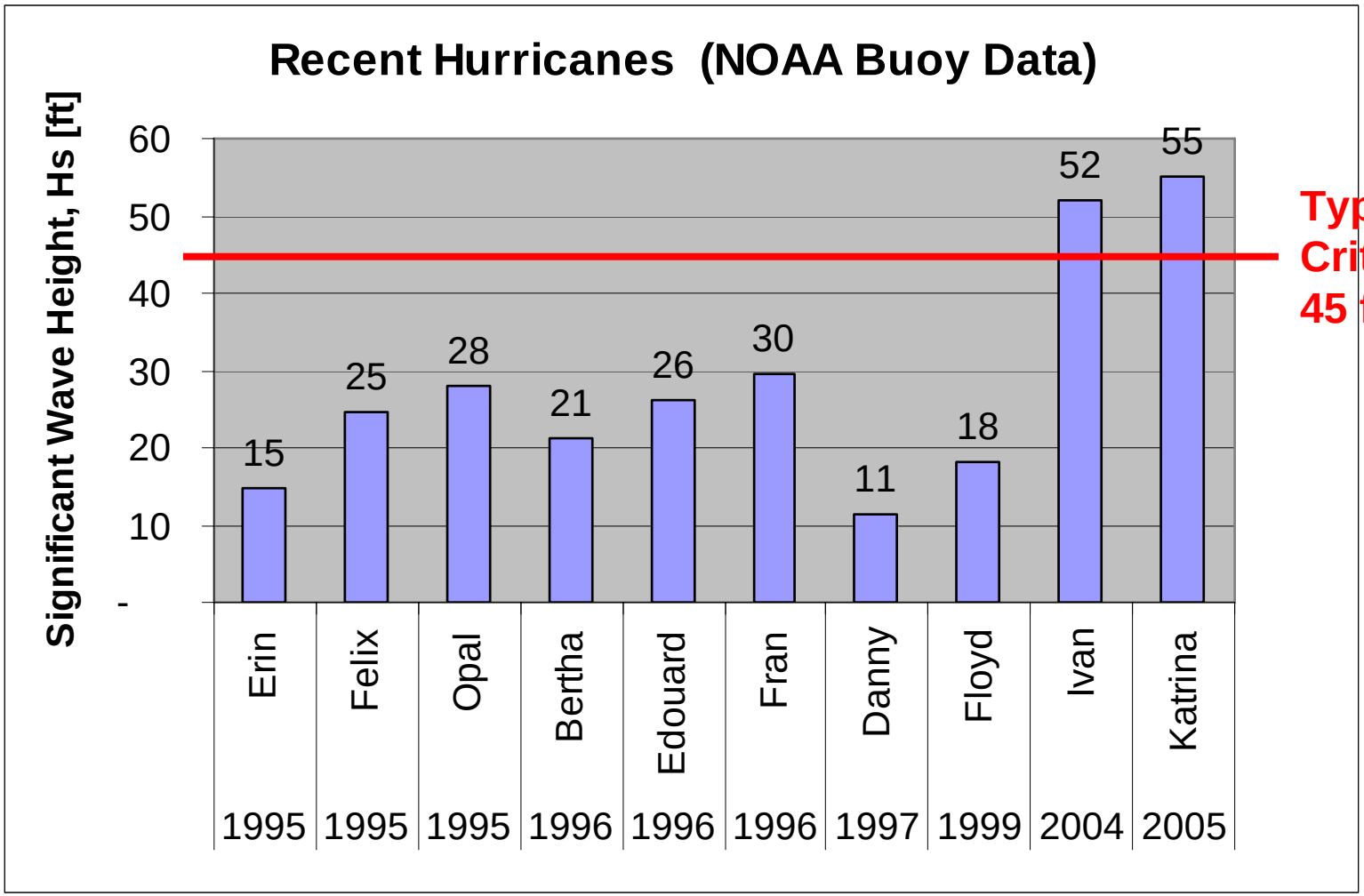


"Maximum" vs. "Significant" Wave Height

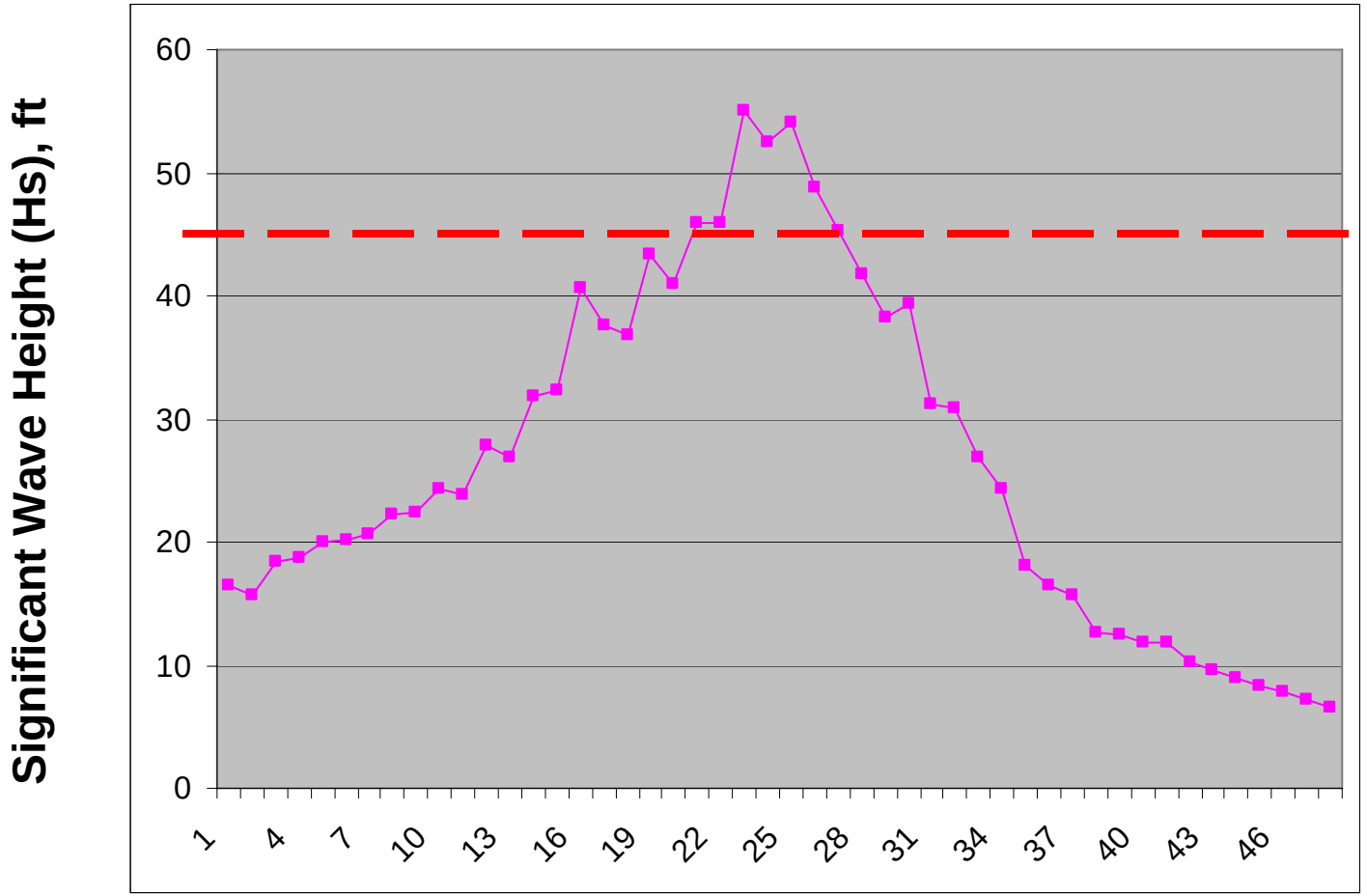


Significant wave height, Hs, is approximately equal to the average of the highest one-third of the waves.

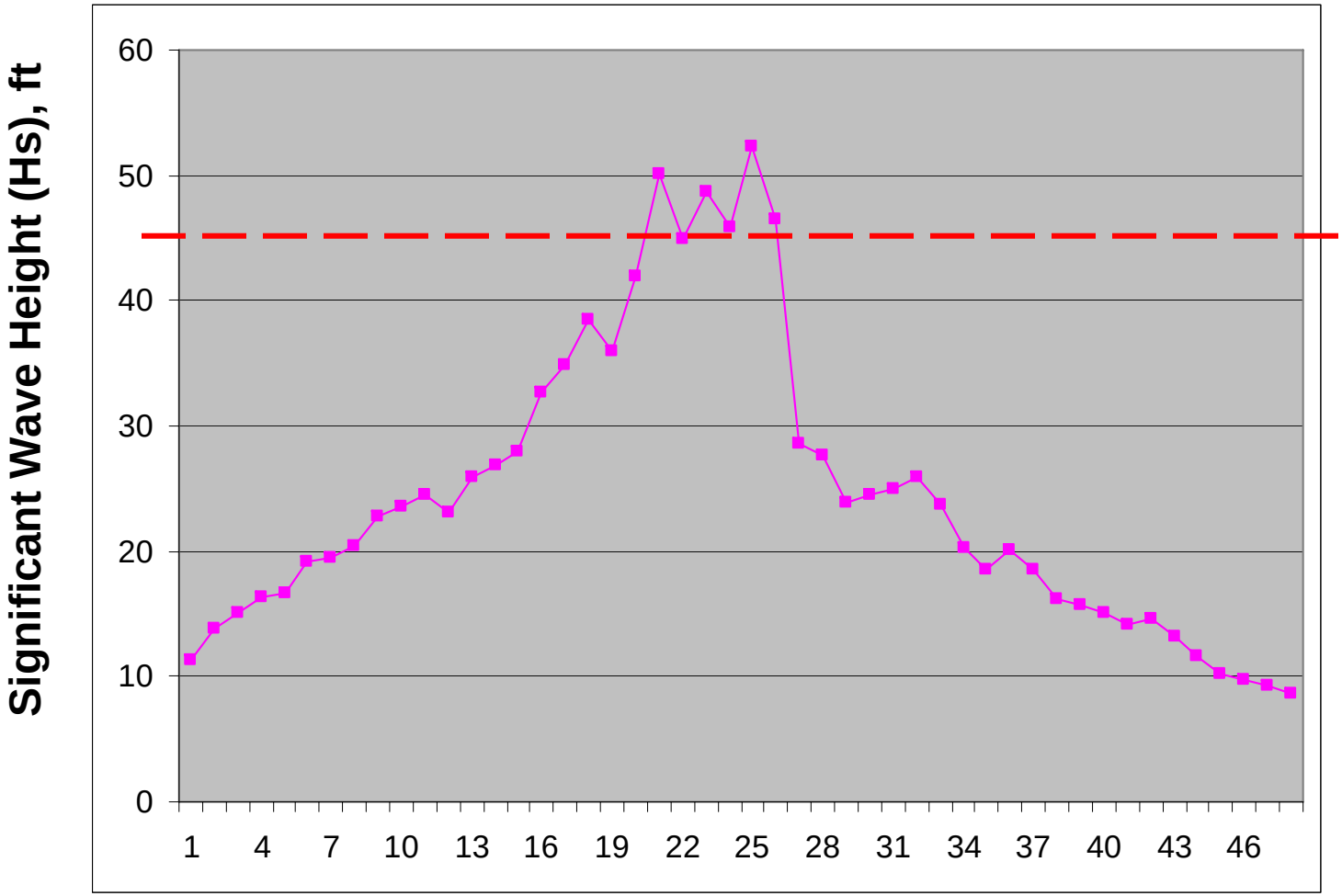
Historical Snapshots



Hurricane Katrina (27-30, Aug. 2005)
Significant Wave Height (Hs)

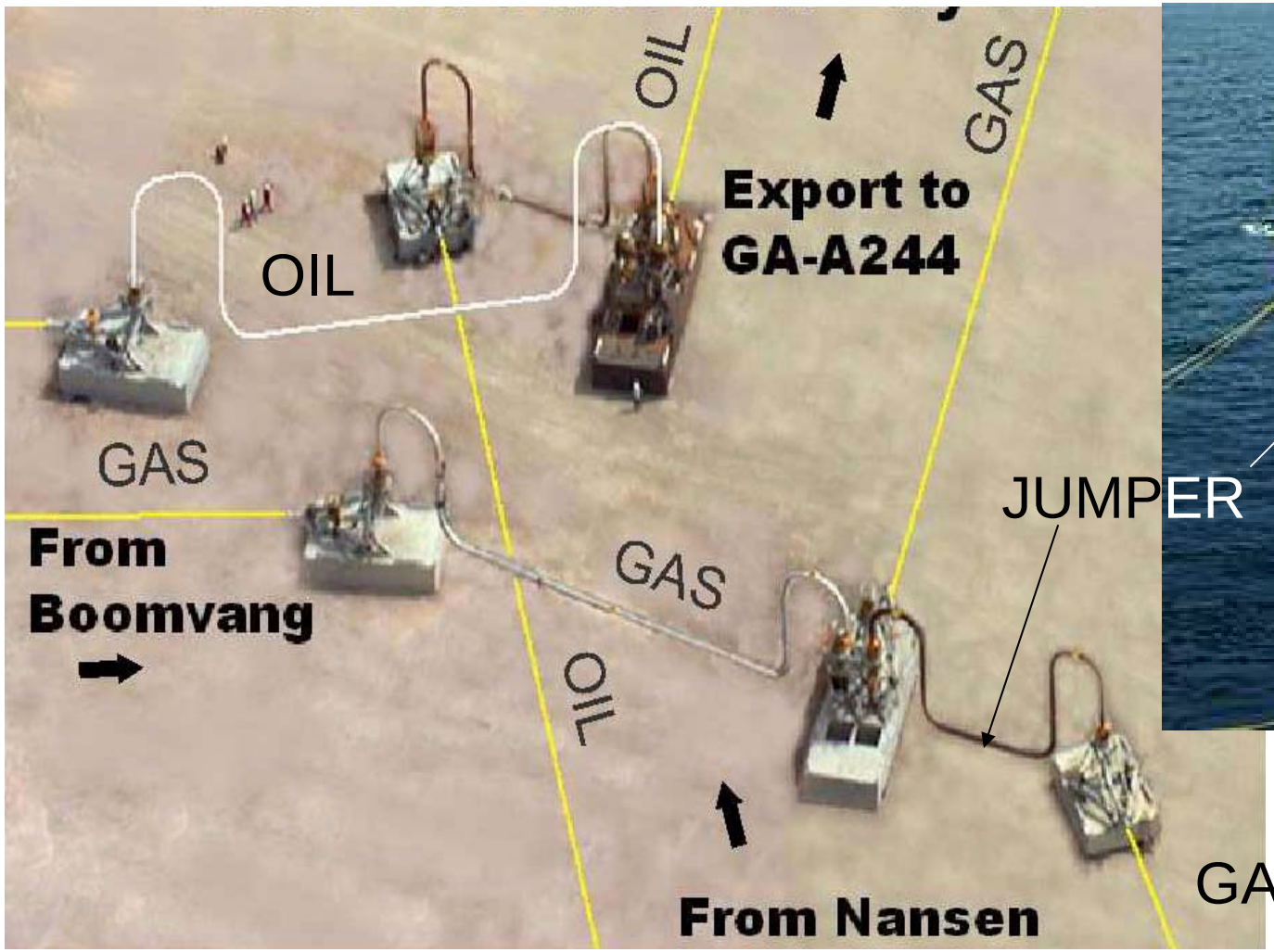


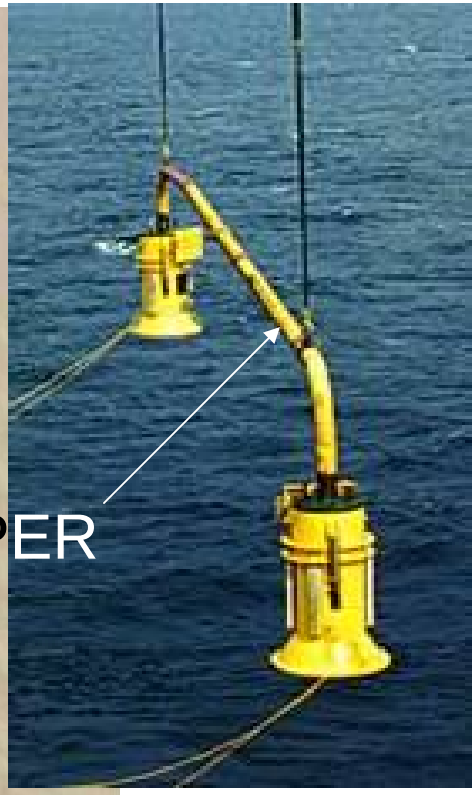
Hurricane Ivan (15-16, Sept. 2004)
Significant Wave Height



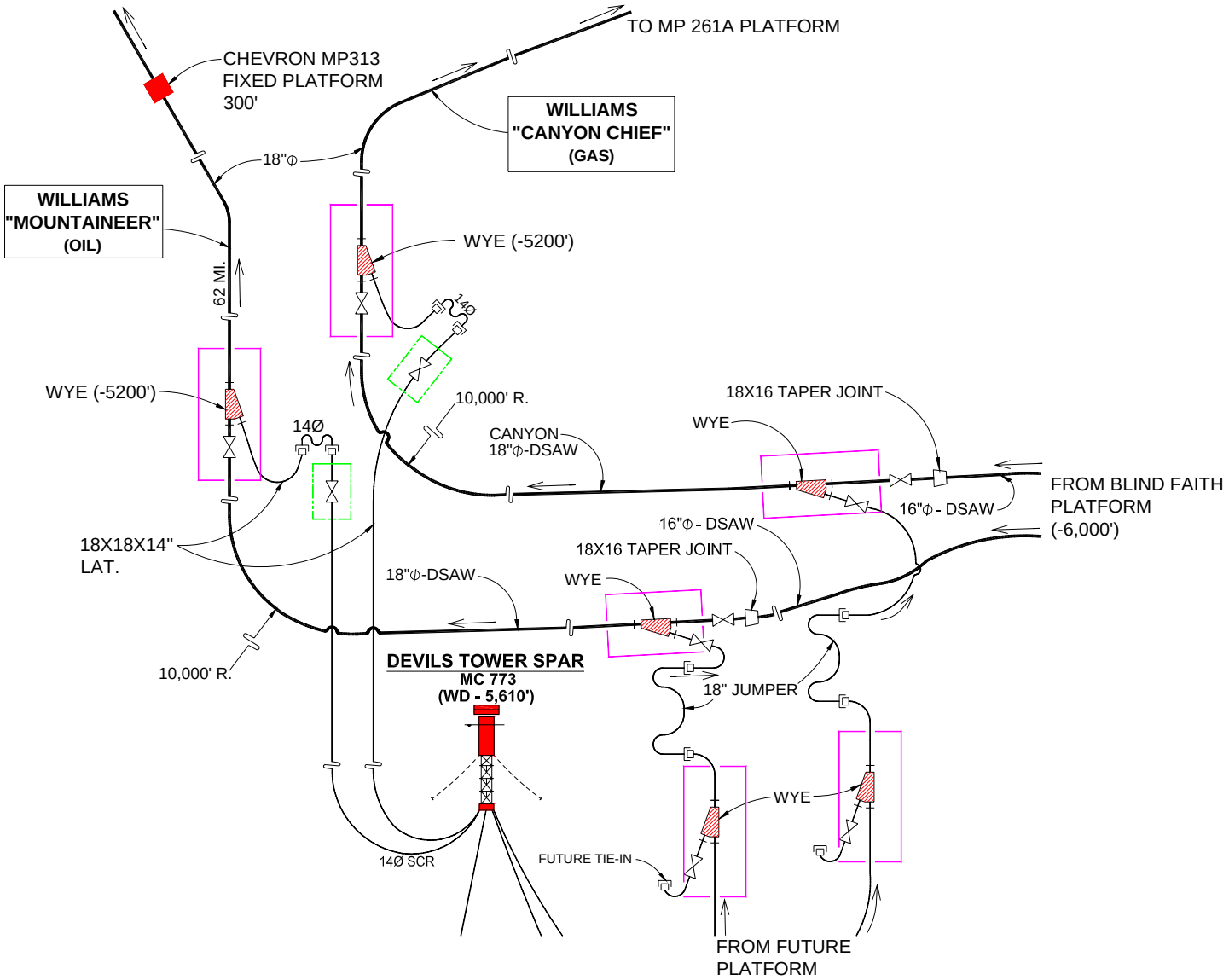
Offshore Booster & Spec-change Stations

Seafloor Tie-ins

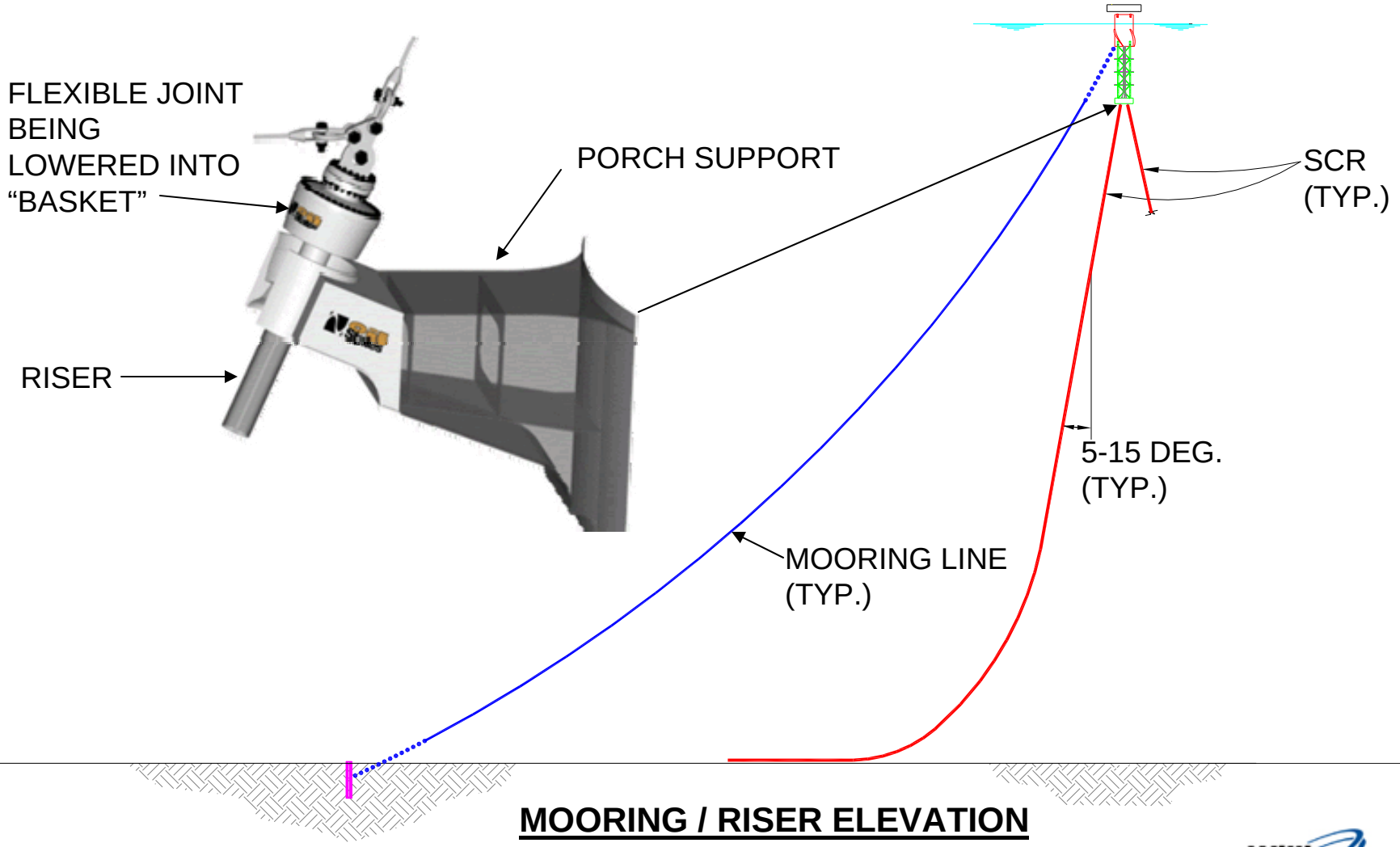




Trunk Line Extension & Lateral Tie-ins



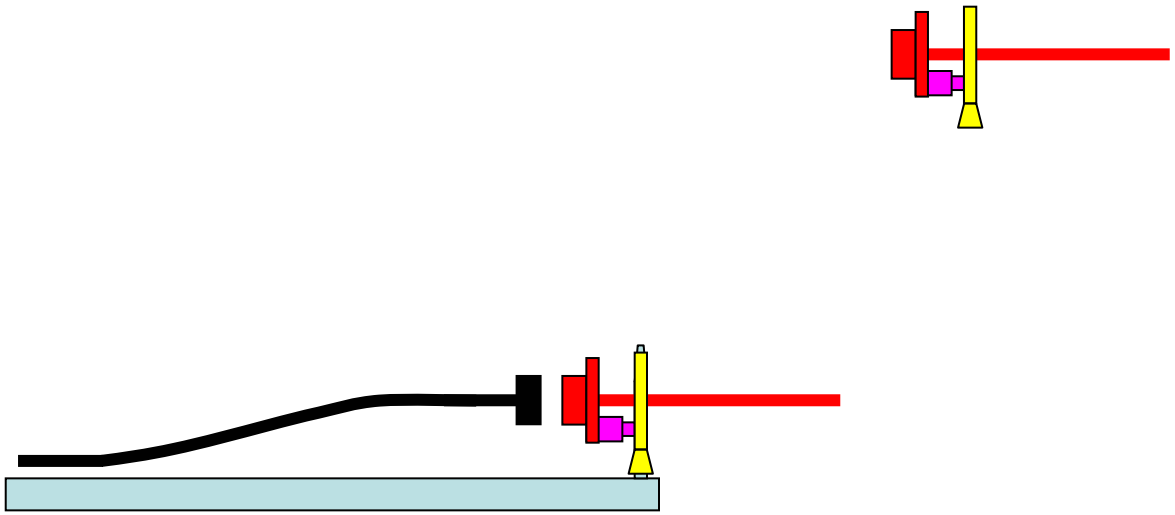
SCR



MOORING / RISER ELEVATION (SHOWN FROM 3000')

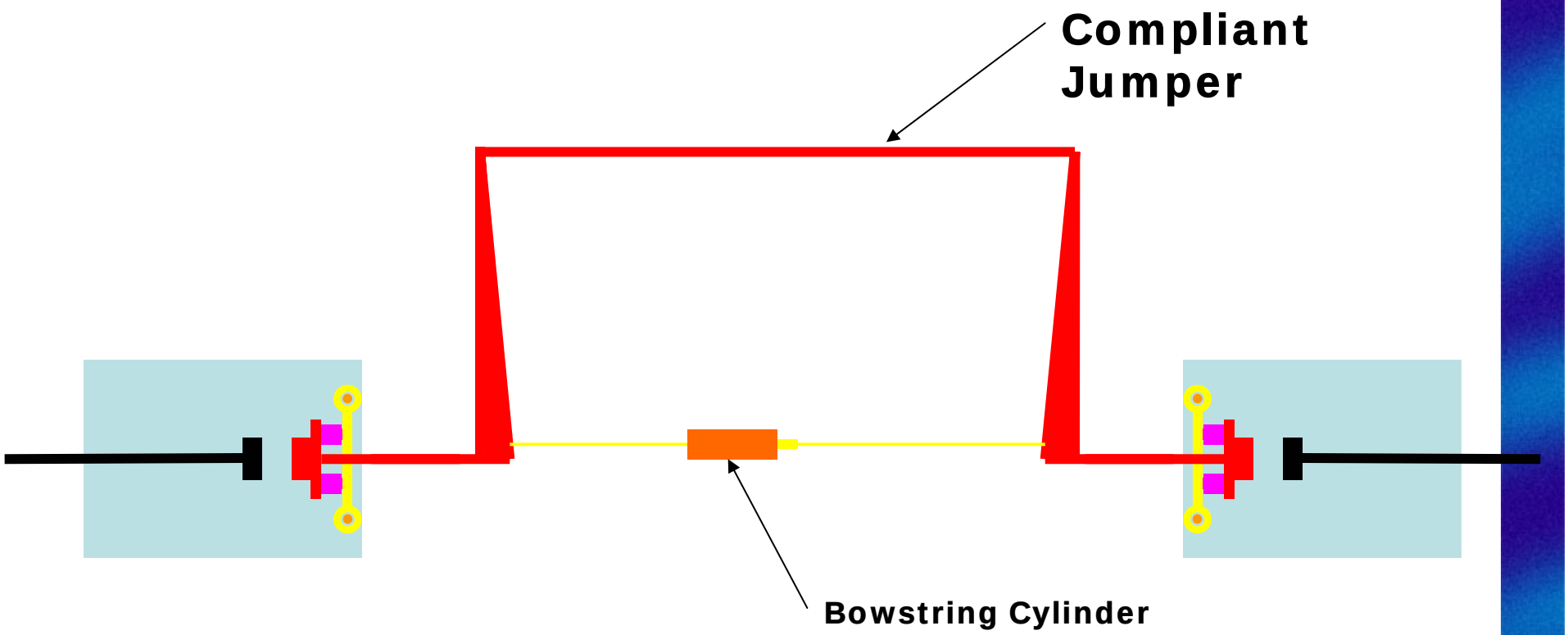
Preferred Deepwater Pipeline Repair

OII/Grayloc Connectors With Alignment Sleds



Deepwater

Pipeline Repair -- Top View of Jumper



Reliability-Driven Design

- Codes and regulations represent minimum criteria
- Selectively increase minimums & add capability where:
  - Inputs / criteria are approximated
    - Metocean data seems to be trending higher – 20 years ahead?
    - Hydrocarbon characteristics of future line contents can vary widely
  - Redundancy is low
    - SCR structure has zero redundancy
  - Consequence of failure is high
    - Pipeline shut in for any reason affects all who are connected
  - Flexibility to recover is valuable
    - Ability to isolate a problem area and keep the main system online
- Increased reliability often can come at low marginal cost

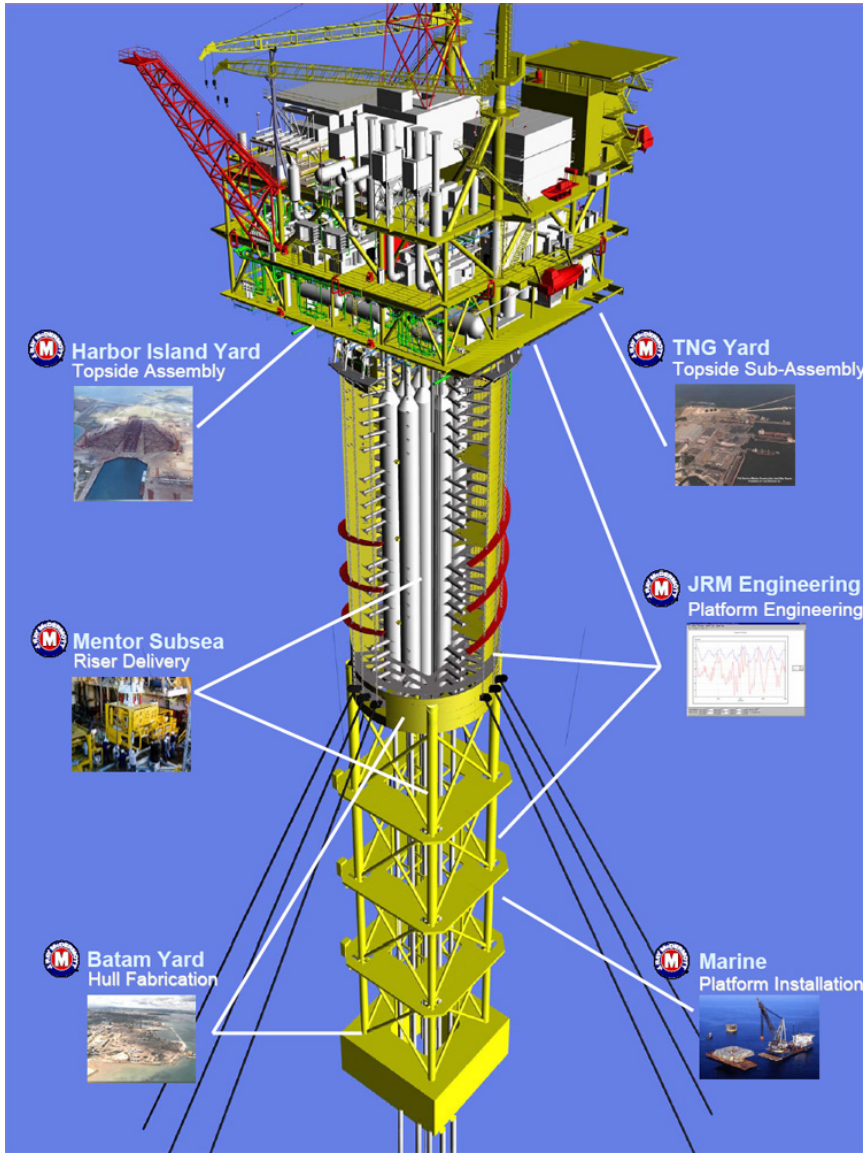
Other Keys to Reliability

- Standardized and systematized:
  - Design criteria
  - Equipment and Material Specifications
  - Execution processes (PLC, etc.)
- Limited menu of line sizes
- In-stock valves, pipe, connectors and specialty tools
- Repair plan execution readiness
- Up to date systems models for real time, line operations
- Experience and continuity of our people
- A culture of trust that intrinsically encourages introspection & pro-actively drives change (there's a mouthful)

Upshot of Trends in Gulf Coast

- Weather increasingly more severe
- Oil supply increasingly scarce
- Energy demand growing globally
- Midstream services increasingly in demand
- Construction costs will be volatile
- Industry's discipline will be tested
- High barrier to entry, low barrier to failure
- Returns must be commensurate

Building Our Deepwater Competencies



- Leadership
- Structural Engineering
  - SCR Design/Verification
  - Topsides
  - Hull & Mooring
- Hydraulics
- Cost Estimating
- Project Management
- Commercial Expertise
- Deepwater Operations

Lessons Leaned from Katrina and Rita

- Incident Command System
- Timely pre and post storm assistance for employees and their families
- Alternative and backup communications, power and transportation systems
- Critical material and supply inventories and staging areas
- Execute agreements for nontraditional services and supplies before hand
- Secure dive boats early for post event offshore inspections
- Liaison with local, state & federal government agencies to expedite permits, variances waivers, etc

Questions?