



TOTAL

The Matterhorn project

Presentation at the Marine Technology Society Luncheon April 22, 2004



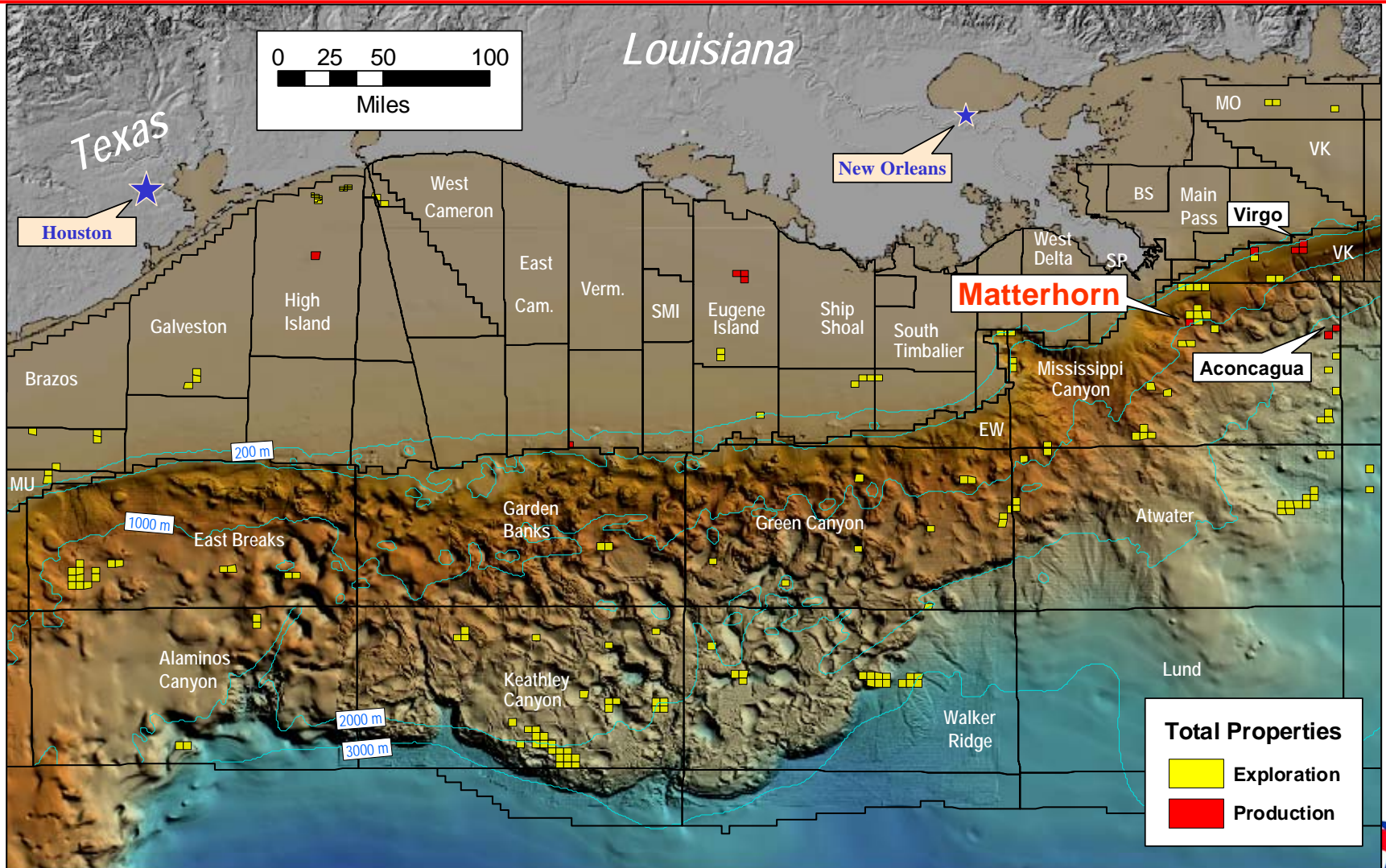
Émetteur

07/05/2004

Agenda

- **General Project Overview**
- **Development architecture**
- **Key challenges**
- **Execution highlights**
- **Conclusions**

General overview

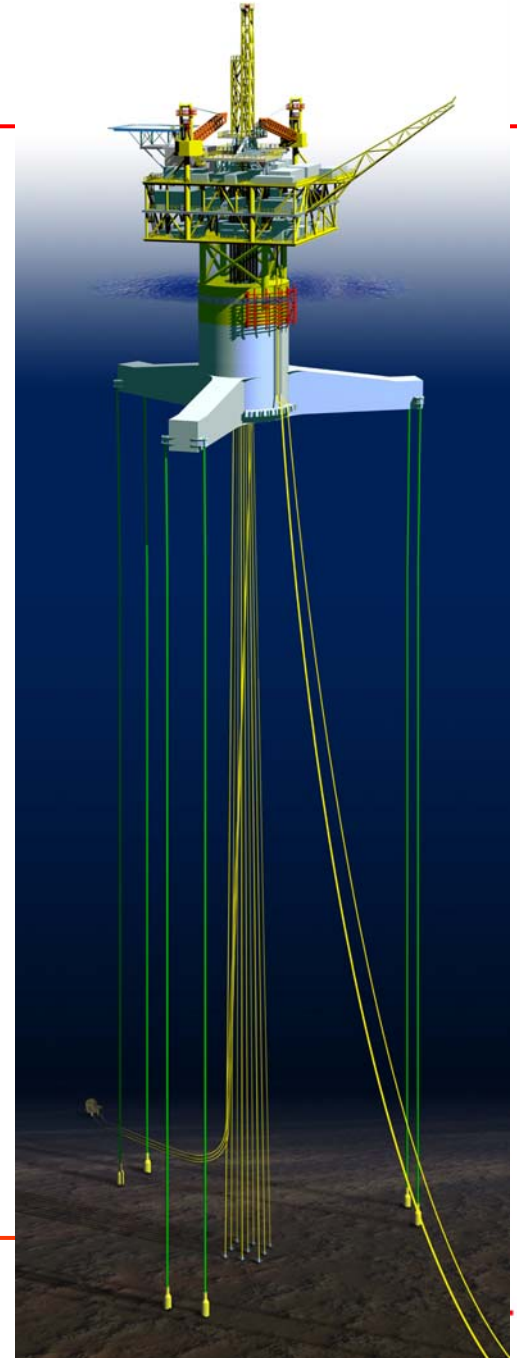


Key Time line

- **Discovery early 1999: 2800 ft water-depth, Multi-layered reservoir**
- **Decision to develop: July 2001**
- **Start development drilling: December 2001**
- **Installation: August 2003**
- **Start well completion: September 2003**
- **First oil: November 2003**

The platform : a SeaStar® TLP

- **Surface piercing structure (TLP or SPAR) w/ dry tree chosen due to reservoir complexity (Multi-levels).**
- **Atlantia chosen after design competition with an EPCI Lump Sum Contract.**
- **Hull : draft 104', height 125', dia. 84' weight 5,500 T.**
- **9 slots for production risers and dry trees (spacing 10'x10')**
- **Mooring : 6 x 32" tendons, 6 x 96" piles (tension 2,800 klbs per tendon).**
- **1,000 HP W/O rig (separate contract).**
- **10" Gas and 8" Oil Export SCR's, WI flexible**
- **Provisions for future subsea tie-backs**
- **ABS Class FOI**



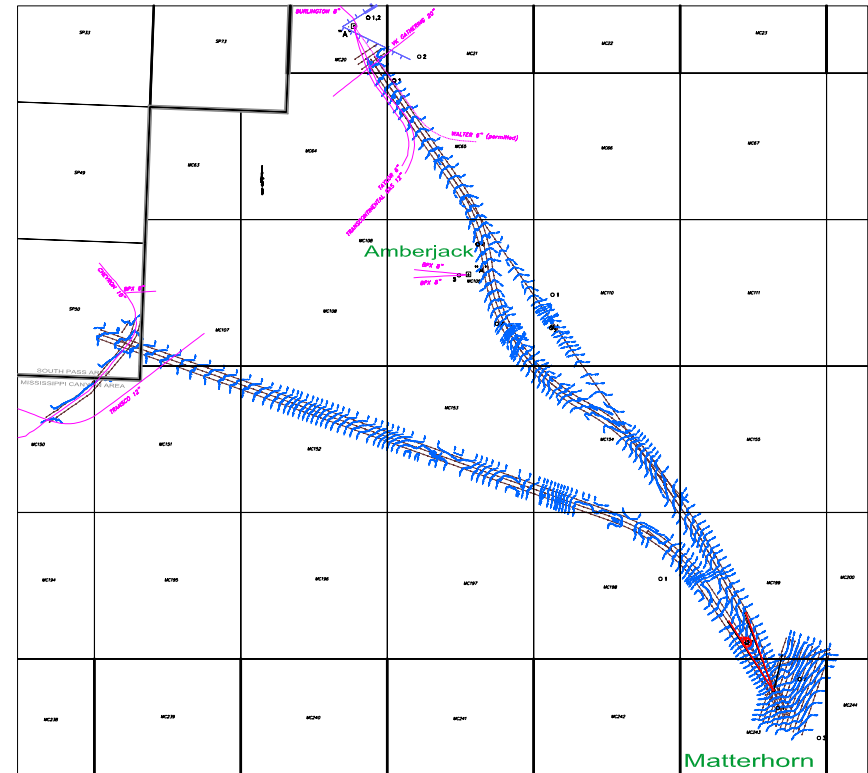
Topsides general Overview

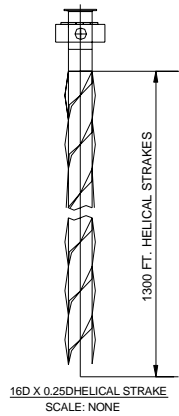


- 140'x140', 3 decks
- 11,000 kips dry, 12,600 kips operating
- 33,000 bopd, 55 MMscfd, 20,000 bwpd
- 100 MMscfd gas drying, WI 30,000 bwpd
- 2 Cranes: 45 t and 75t
- 2x 4.5 MW turbines (2x50%); 1.2 MW e-gen
- Gas engine driven recip. compressors
- 3 survival capsules, 50 pax each
- LQ: 22 pax permanent, 78 temporary
- Blast & fire wall
- Helideck: 56'x56' for Bell 412, Sik 76

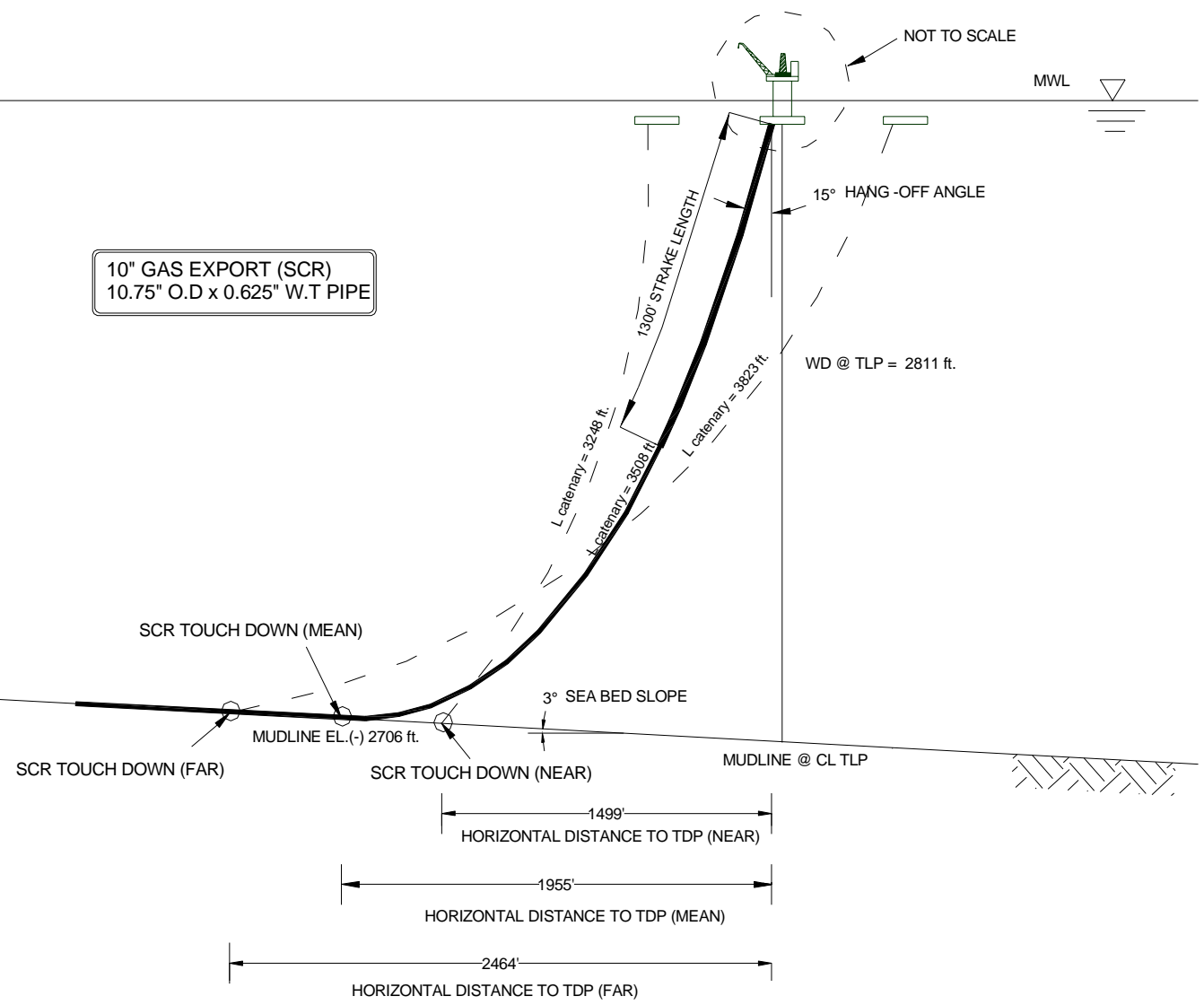
Risers and pipelines

- Export by two 16 miles pipelines (8" and 10"), 8" owned by Chevron.
- Hot-tap tie-in points to trunklines

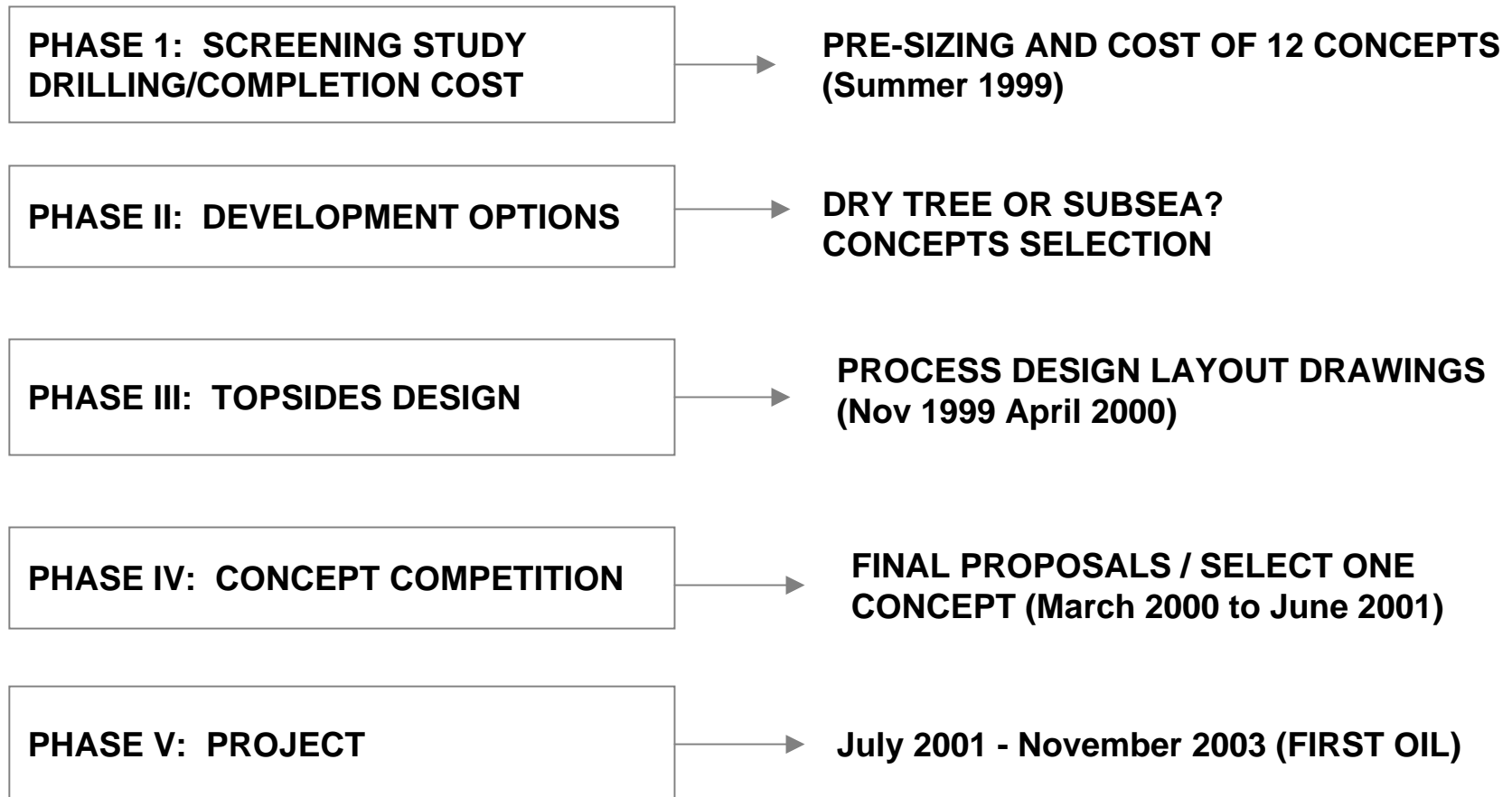




10" GAS EXPORT (SCR)
10.75" O.D x 0.625" W.T PIPE



Development architecture screening process



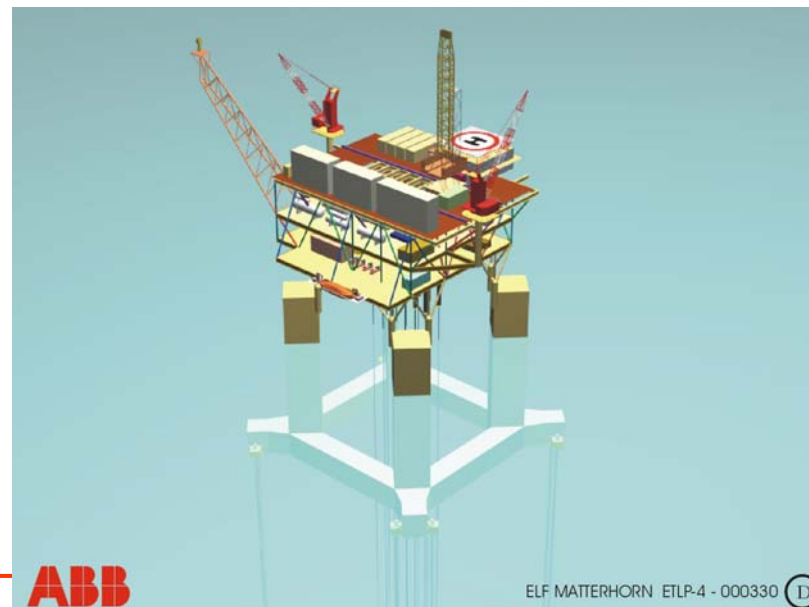
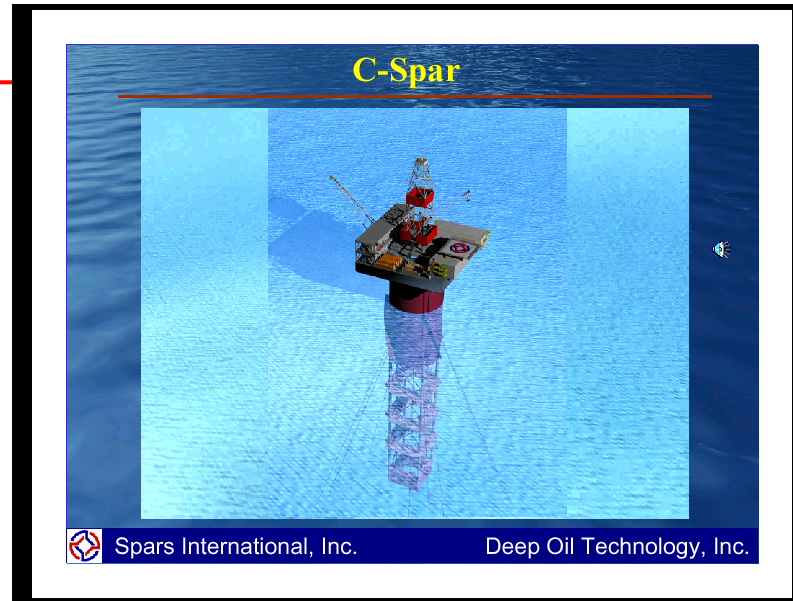
Concepts Considered in Phase I (Screening Study)

- **Dry Tree**

- Atlantia
 - Modec
 - ABB
 - Spars
 - Kvaerner
 - Technip
 - Mustang
 - Hutton TLP
- Sea Star ®
 - Moses
 - TLP and Mini-TLP
 - Classic Spar and Truss Spar
 - DDF
 - TPG 3300
 - Compliant Tower

- **Sub-Sea**

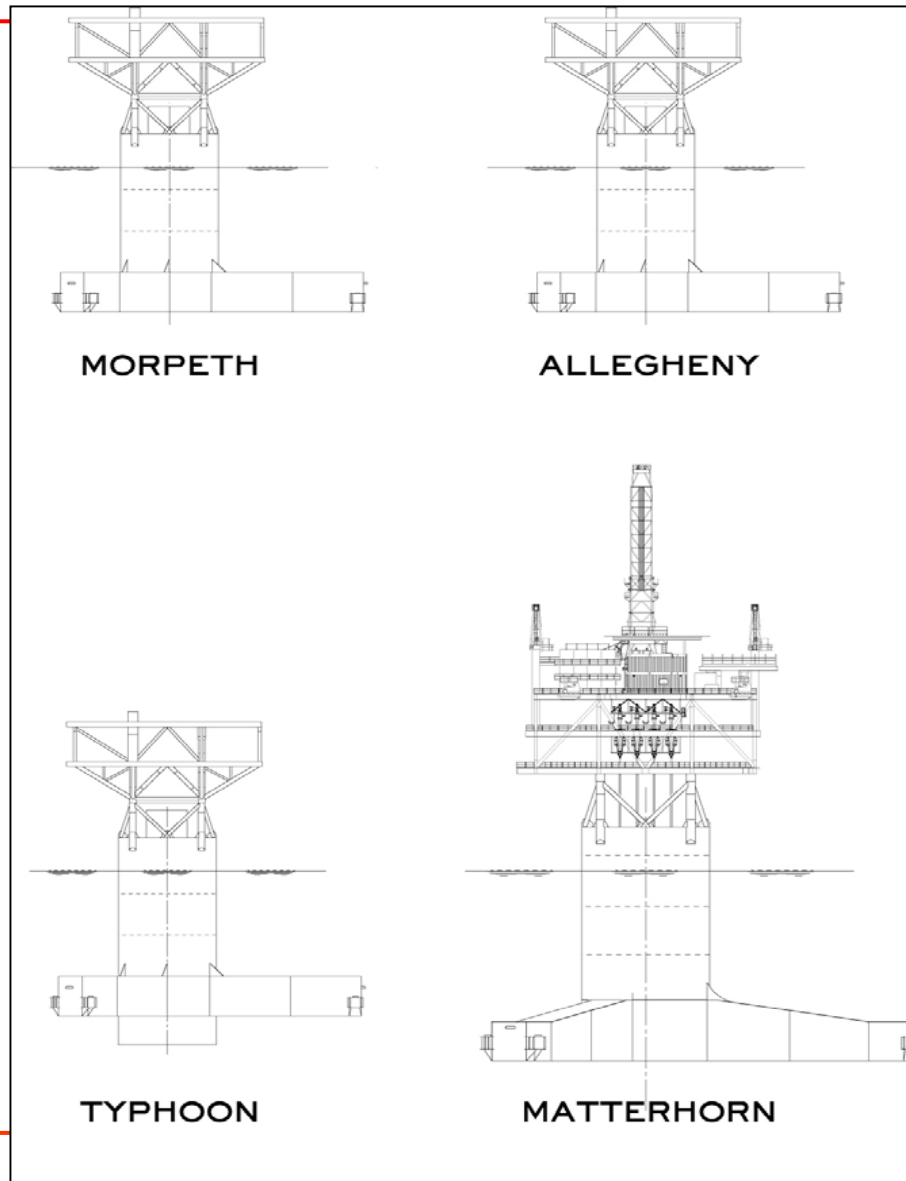
- Atlantia
 - Cal Dive
 - Oceaneering
 - Intec Remote Subsea (
- Sea Star ®
 - EGB Semi-Submersible
 - Converted Semi-Submersible
 - Taylor MC 20 Platform)



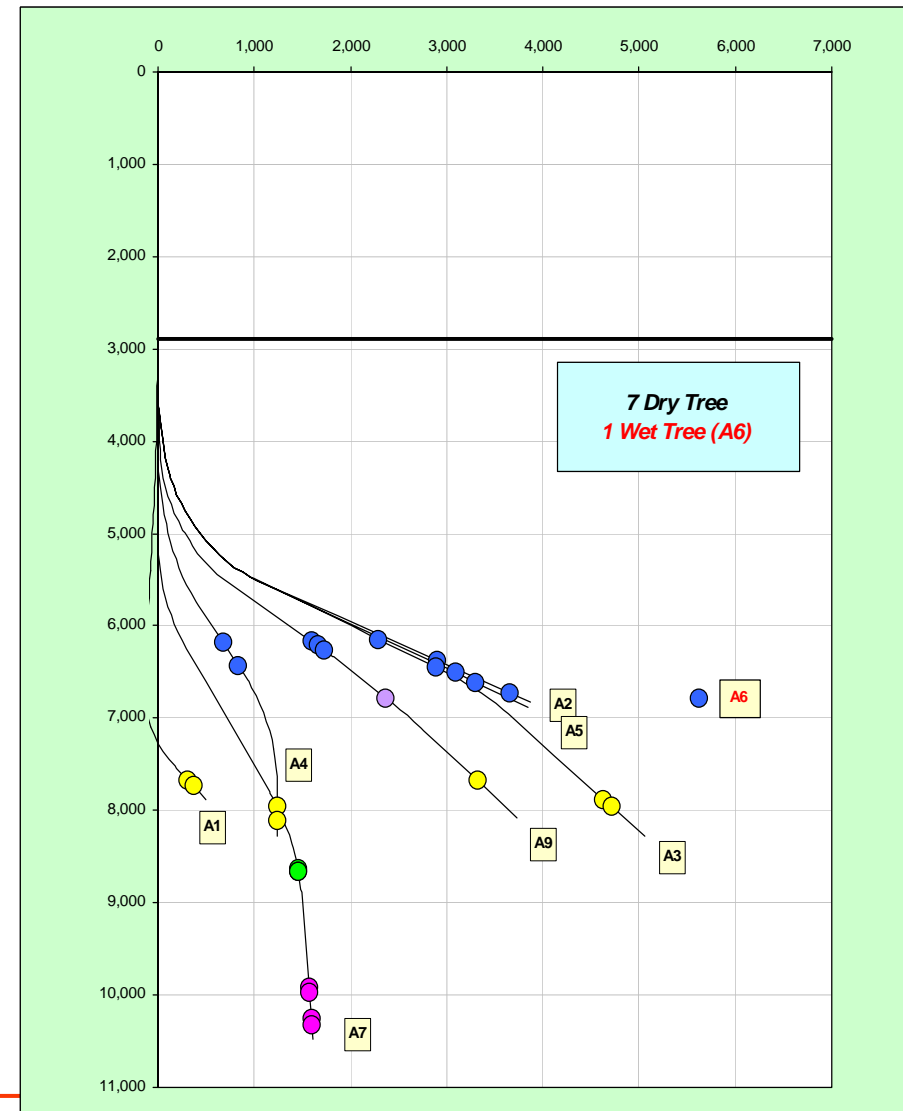
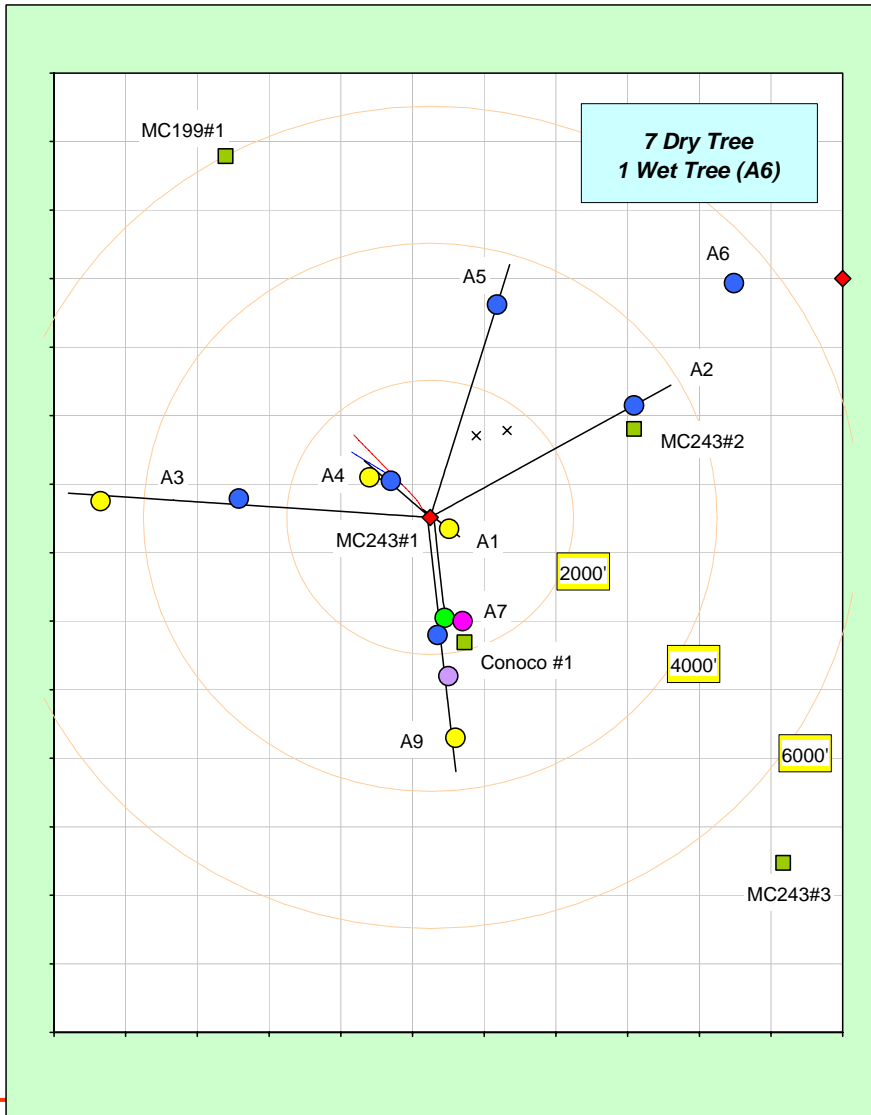
Key Project Technical Challenges

- **Drilling: Deviated wells with shallow kick-off and shallow water flow**
- **Biggest mono-hull TLP and first with dry risers**
- **Met-Ocean: consideration of Cold core current profile**
- **Production risers with Surface Xmas trees: Keel joint development**
- **Reeled SCR's**

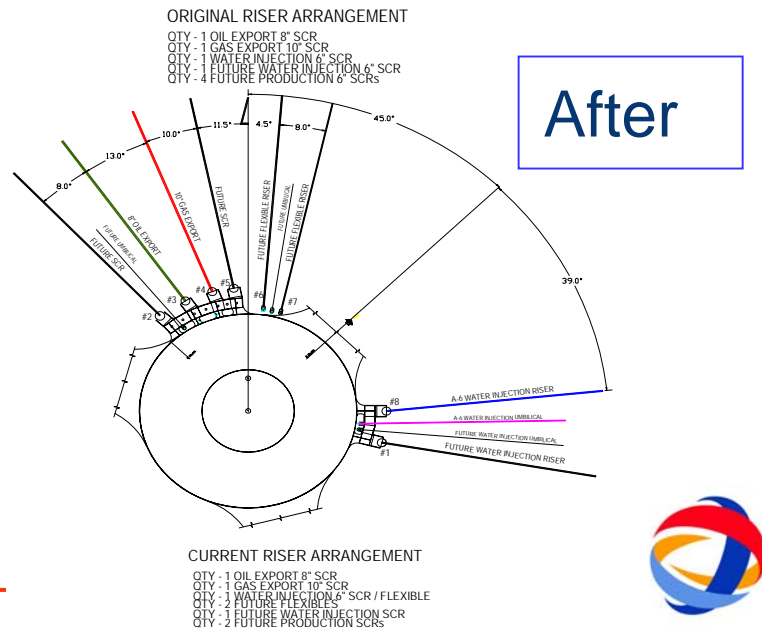
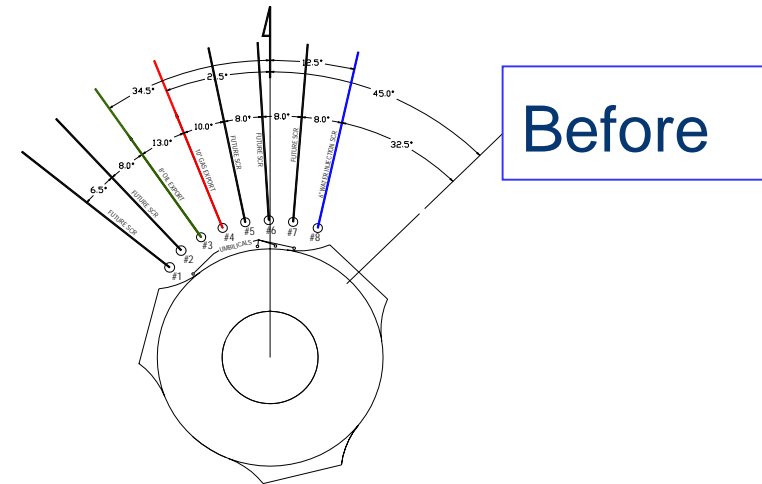
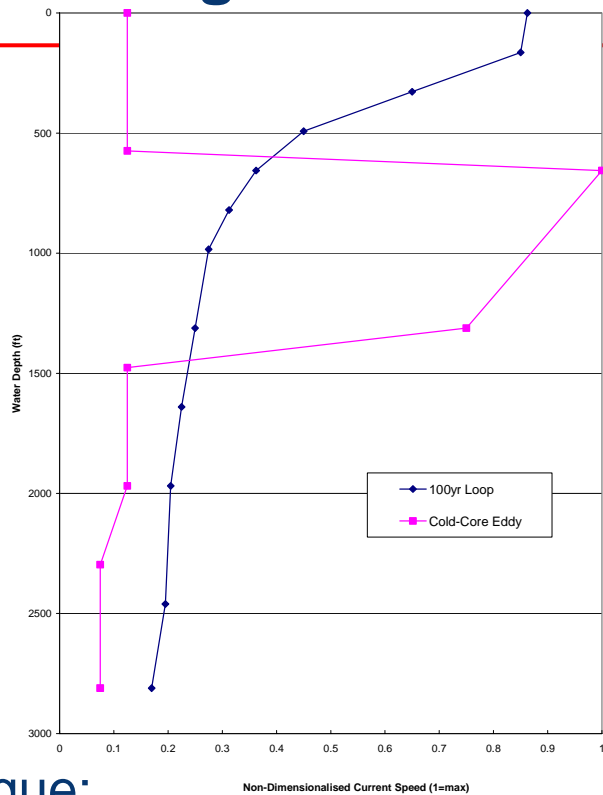
Challenge: biggest mono-hull TLP + dry trees



Challenges: Drilling of High Angle wells

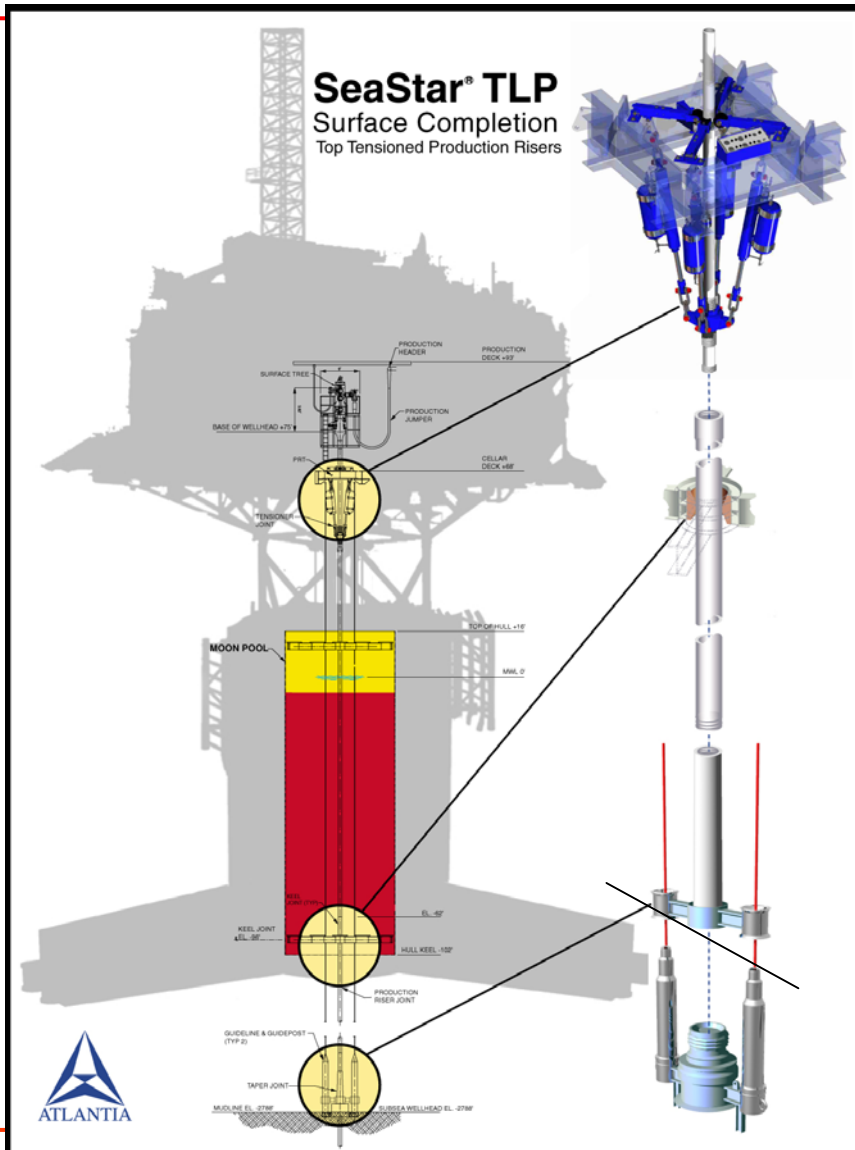


Challenges: Consideration of Cold Core Current (CCE)



- Fatigue:
 - ✓ design life at 10 x recorded event
 - ✓ Need fairings to 1500'
- Platform offset
- Riser/tendon interference

Challenges: Production riser keel joint



C. van der Linden

07/05/2004



Project Highlights

- **Drilling**
- **Construction**
- **Installation**
- **Production risers**
- **SCR's**

Drilling: pre-drilling of 7 wells, seabed spacing 25ft



Hull construction by Keppel/Fels - Singapore



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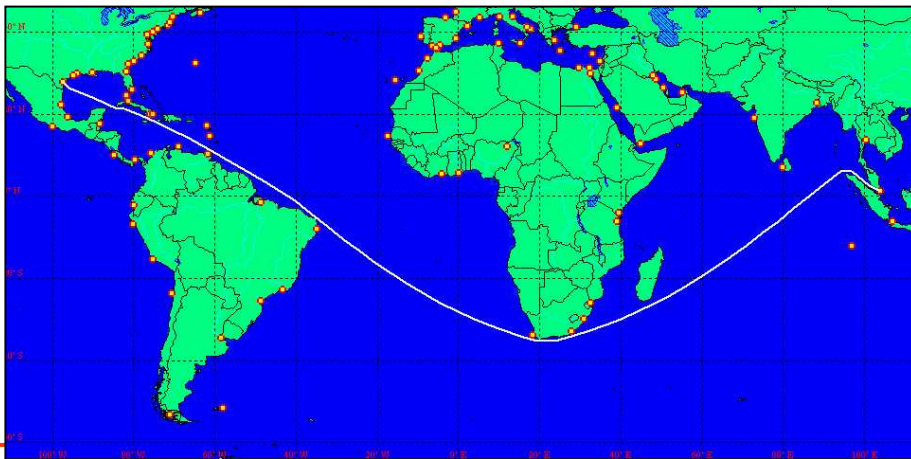
Topsides Construction by Gulf Marine Fabricators



Tendons fabrication by Kiewitt Offshore



Hull transport on the Tai an Kou



C. Van der Linden

07/05/2004

HULL Load-on Transportship

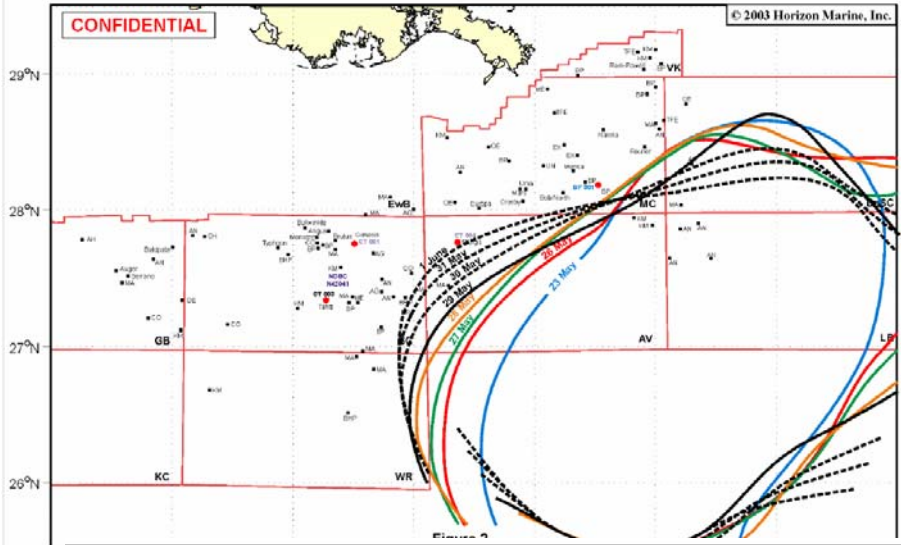


Installation by HMC Hermod

- Installed piles in March 03.
- Tendon Installation started on June 3, 03.
- Went on Stand by during tendon installation on June 10 due to high current (Eddie Current >1.5 knts) and two tropical storms.
- Resumed work on July 16 after 34 days stand-by
- Deck was set on August 3.
- Platform was habitable on Aug 5.

Eddy Currents

EDDY SARGASSUM PROGRESSION & PROJECTION 23 MAY - 01 JUNE, 2003



EDDY SARGASSUM PROGRESSION & PROJECTION 03 - 08 JUNE, 2003

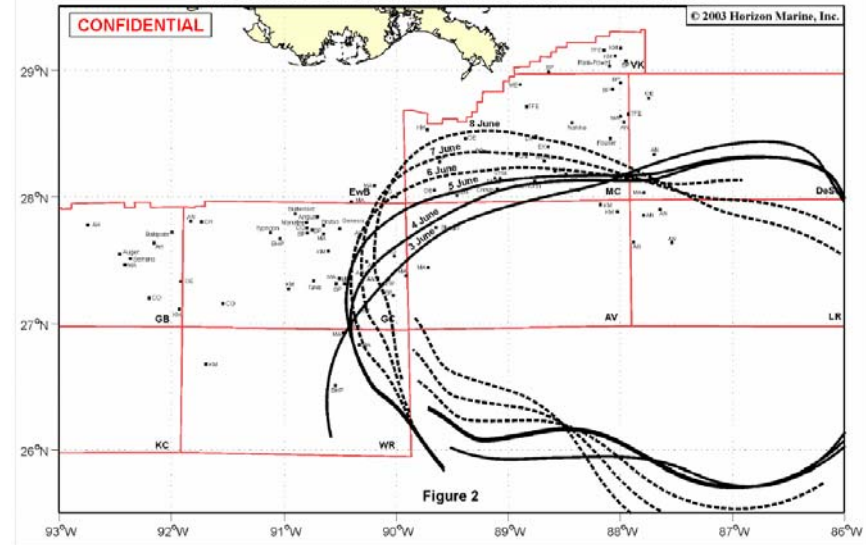


Figure 2

EDDY SARGASSUM PROJECTION 09 - 15 JUNE, 2003

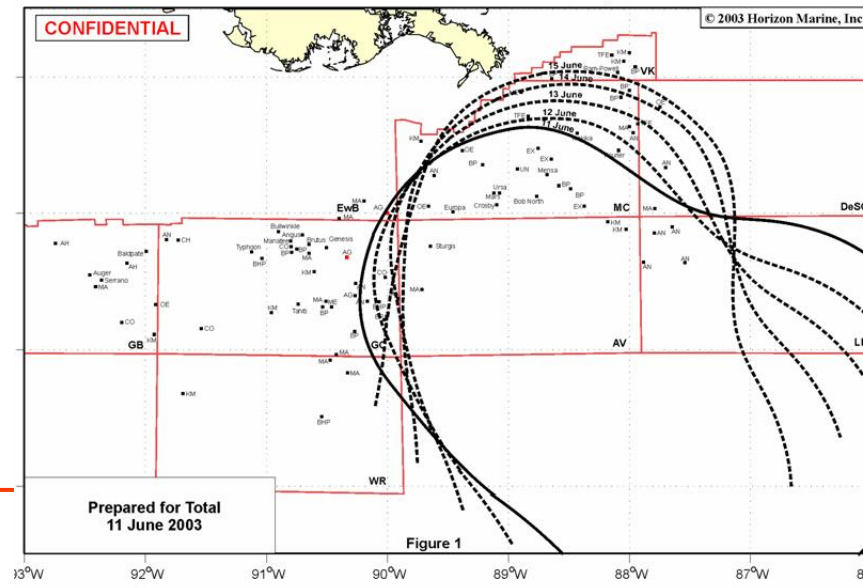
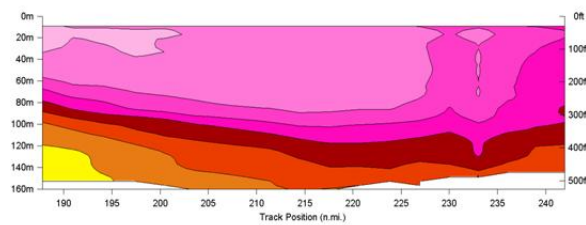
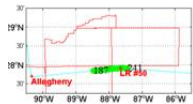


Figure 1



Leg 03 Transect

2-4 June 2003
Eddy Sargassum Survey
R/V Pelican

Horizon Marine, Inc.
15 Creek Road
Marion, MA 02738

Prepared for Total
11 June 2003

Pile and tendon Installation



Buoyancy cans



Tendon spacer

Hull Installation

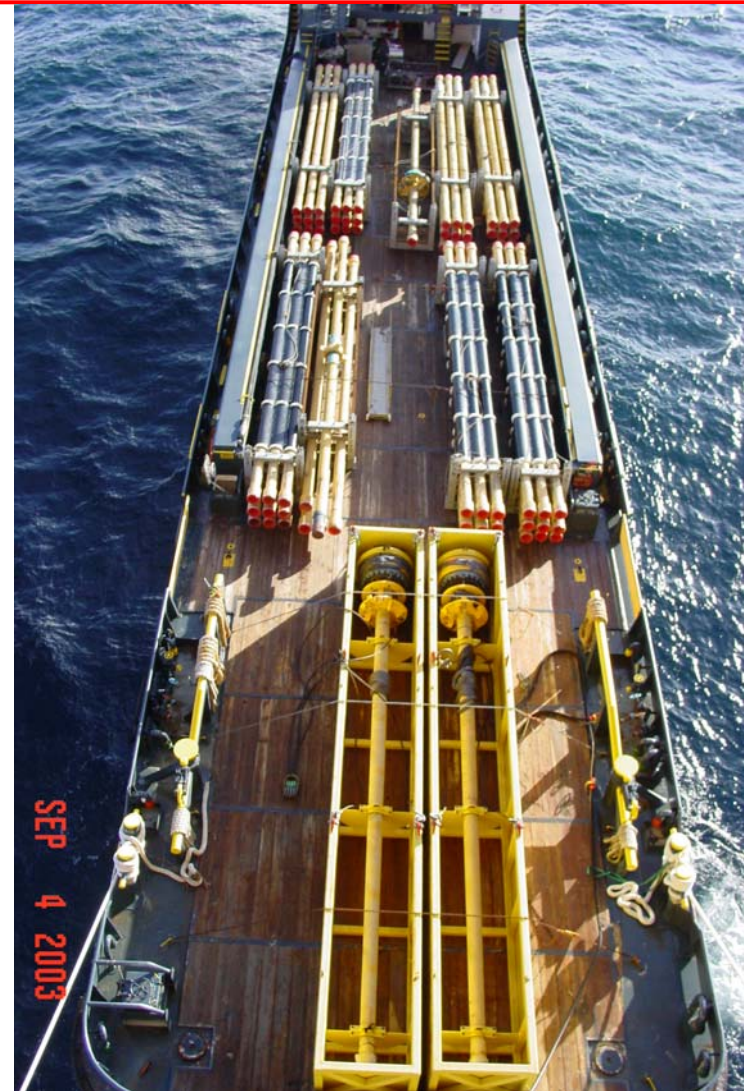


Hull Prior to Installation

Topsides lift: 5800 t

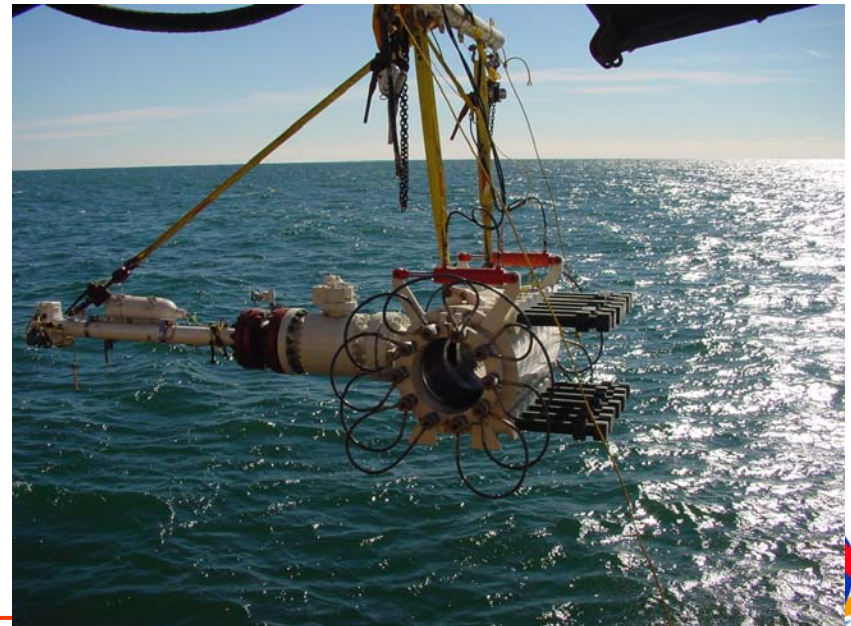


Production risers



Pipelines & sub sea

- Multi-contract & PO approach
- Pipelines were installed in April May 2003 by the reel-ship Deep Blue (Technip) before platform installation and picked up by the crane barge Hermod.
- Commissioning by Stolt
- Subsea injection well completion and connection to be performed in May-June 2004.



SCR Results

- **Installed Within Tolerance**
- **Both Lines Have Been Pigged**
- **CP Inspection Results OK**
- **Touchdown Point Trenching As Predicted**



Conclusions

- 3.2 Million manhours
- LTIF <1
- 24 months between sanction and deck mating
- 27 months to first oil
- 4 wells producing to-date

