## Overview of Deep Gulf Energy Companies

### Deep Gulf Energy Background
- Exploration and Production Company focused solely in the DW GOM
- Private company backed by the First Reserve Corporation
- Proven Management Team
  - Over 20 years of experience executing projects in the DW GOM
  - Founders of Mariner Energy (1996)
  - Three ventures with First Reserve (2005-present)
- Excellent safety record since inception
- Based in Houston, Texas
- Employees and consultants: 84
- Have invested over $1.5 billion in the DW GOM since inception of Deep Gulf

### DGE Strategy Highlights
- Specialize in subsea developments tied back to existing host platforms
- Develop projects that are not material to or are out of the focus area of the major oil companies
- Focus on exploitation and low risk exploration prospects
- Concentrate in oil prone areas of the DW GOM near existing Infrastructure
- Operate to control quality and timing
- Low cost operator
- Get projects on stream quickly (less than 2 years from discovery to first production)
- Invest in a portfolio of opportunities
- Partner to diversify risk
DGE Companies Experience

Team Deepwater Operating Experience
While working at Mariner & DGE

Total 38 SS Developments
20 Operated

Total 58 SS Completions
28 Operated

Total 76 Wells Drilled
41 Operated
First Reserve Corporation

- Leading private equity firm specializing in the energy sector globally
- Formed in 1983 / 30 years of experience
- Offices in Houston, London and Greenwich
- Have invested over $20 billion in equity transactions since inception
- Funded Equity to DGE Companies of $646MM
Overview of Deep Gulf Energy Companies

**Recent Activity**
- Bought 2 fields and have had 5 exploration discoveries since 2012
- Net Production
  - Current: 6,000 BOEPD
  - 2018 Prod: 19,842 BOEPD
- 3-4 exploration prospects over the next 12 months

**Current Developments**
- Big Bend: 10% WI
- Marmalard: 12 % WI
- SOB II: 12% WI
- Odd Job: 59% WI
- South Santa Cruz: 40% WI
- Barataria: 23% WI
- Kodiak: 29% WI
Kodiak Development

- Discovery by BP Americas 2008
  - Mississippi Canyon 771/727
  - Well water depth 4,833-ft
- Acquired by Deep Gulf Energy II in 2012
SITP >14,000 psi
Temperature >275°F
1% CO₂
Asphaltene potential
Wax deposition potential
Major Challenges

- Drilling and completion of a HPHT 30,000’ well
- Installed 9 X 200 kip buoyancy cans to increase variable deck load for topsides and riser/umbilical systems
- Installed 3 pull tubes in the hard tank slot through the soft tank to accommodate riser and umbilicals
- First use of reeled CRA lined riser/flowline in GOM
- Subsea controls, chemical injection, and processing equipment module installation
Additional Buoyancy

- Tieback adds additional payload to topsides and riser/umbilical loads on hull
- Addition of 9 buoys to mooring lines at mid water link plate
- Platform motions recomputed
Additional Buoyancy

Open bottom, pressure-equalized buoy

Buoy
15ft Dia. x
37ft Long

Shackle

5” D-Ring

Link Plate

Lower Wire rope

Upper Wire rope

2” Tether Sling

Link Plate
Riser and Umbilical Pull Tubes
Riser and Flowline
Corrosion/Erosion Assessment

- HPHT and CO$_2$
- Erosion rates high for single flowline tieback
- Corrosion Resistant Alloy UNS00625 material selected as best option
  - Selection based on mechanical properties at pressure and temperature, fabrication processes, weldability and installation track record
- Flowline system from the tree to production separator is CRA clad
Design Considerations

- Design concerns are thermal cycling and potential lateral buckling.
- Fatigue sensitive region at interface of liner and overlay.
- Use of sleepers to increase pipeline compliance.
- Wet insulation on Steel Catenary Riser helps with top tensions compared to Pipe in Pipe.
Clad Pipe
Mechanically Lined Clad Pipe

- X65 base pipe lined with CRA (Alloy 625)
  - Mechanically lined pipe for flowline with overlay in ends
  - MLP and overlay for riser and FLET piping
Expansion Process
Flowline Fabrication - CRA Welding

- CRA consumable consistent with alloy 625 liner (e.g. grade 625/686 material)
- Need to overmatch pipe properties for installation (reeling) and operation (high temperature)
- Control of carbon steel yield strength at mill (65.3-ksi min to 79.8-ksi max)
Flowline Fabrication - CRA Welding

- Automatic welding for consistency and process control
- Pipe geometry challenges welding
  - Relatively small diameter of pipe (5-in ID)
  - Wall thickness range 1.0-in to 1.25-in
CRA Pipe Installation

- CRA clad pipe has history of use in subsea systems world wide
  - Overlay of pipe
  - Clad and longitudinally seam welded
  - Mechanically lined

- Main installation methods have been J-Lay and S-Lay
Reeling of CRA Clad Lined Pipe

- Reel lay most cost effective
- Installation contractors have developed reeling processes for mechanically lined pipe through JIP’s and use of DNV RP-A203 qualification process
- Installation contractor’s first project for reeled CRA pipe (mechanically lined) was completed in Brazil (2013)
Spooling
Technip Deep Blue
Devils Tower Module
Installation
Olympus Loop Currents
Topsides Module Installation

Devils’ Tower

Clearing/Break
Well was successfully drilled and completed
Flowline and riser pipe are at Technip spool base welding stalks
Umbilical loaded on Deep Blue ready for installation
Production and MCC modules installed and construction ongoing
First oil Q4 2015
Acknowledgements
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