Devon Energy Corporation

Eugene Island 330 - B & C Deck Raising Project

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Field History / Background

• EI 330 Field discovered in early 1970’s
• Field experienced WID in both Lili and Rita & incurred underwater damage
• EI 330 S (4-pile; pump & compressor platform) toppled from apparent WID during Rita
• EI 330 Field remains S/I awaiting final pipeline re-routes and tie-ins
Eugene Island 330-C and B
• EI 330 B & C have same structural design
• 8-pile platforms: B - 18 wells; C - 24 wells
• 1,900 ton deck
• Pre-Lili and Rita, passed API RP-2A, Section 17 Ultimate Strength Analysis w/ Full Population hurricane
• Post storms - performed rigorous platform assessment
• Developed a multi-pronged approach to enhancing survivability
Options to improve platform survivability

- Make jackets more robust by grouting members or adding/replacing braces
- Install a jacket next to jacket for reinforcement
- Remove barge bumpers, OOS risers and other appurtenances near the waterline
- Plug wells and remove conductors
- In the case of WID, raise the deck
Rita Damage – Eugene Island 330 C

EI-330-C
Well Bay Area
North End

Well control panel along with tubing and tray received damage as well as the PA station

09/26/2005
Rita Damage – Eugene Island 330 C

General Damage to electrical, pneumatic's, hand rails, walkways

09/26/2005
EI 330 Platform Model - Deck Raising

Before

After

Note – Jacks to be removed
Leg Extension - Design Features

- Leg sleeves are used to contain the leg throughout jacking operations
  - Controls leg “spring” during cutting operations
  - Provides complete lateral stability during jacking operations

- Sleeves provide the leg extension in the final condition
Leg Extension - Design Features

- Legs are pre-cut 60% of circumference prior to installing sleeves (meets A-2 case)
- Final leg cut is made after sleeves have been installed and jacks have been pre-loaded.
- Final leg cuts made through windows in the sleeve
- After jacking, high capacity pin connection allows for ram removal during final weld out
Leg Extension - Fabricated Sleeve
Lift Steel - Upper & Lower Bushings

**VIEW BEFORE EXTENSION SLEEVE INSTALLATION**

**VIEW AFTER EXTENSION SLEEVE INSTALLATION**

**FIRST CUTS**
 SCALE: 3/8" = 1'-0"

**REMAINING CUTS**
 SCALE: 3/8" = 1'-0"
Upper & Lower Bushings
Top of Sleeve on Upper Bushing
Lift Steel - Leg Sleeve Extensions
Jacks Extended - Pin Inserted

INSTALL 12" Support Pin
NOTE: Cylinder not shown for clarity
Deck Jacking - Design Features

- Use four 260 short ton hydraulic jacks with 15 feet of stroke at each leg
- Synchronized control system to keep leg travel within +/- 1 inch tolerances
- Extension of each leg measured by 2 string potentiometers with manual backup
- Jacking operation (unpinned condition) designed for 40 knot sustained winds
- Storm safe for A-2 conditions after pins engaged in legs
- A-1 storm safe after jacking and weldout
System Integration Test - Sept. 28, 2006
EI 330 C Deck Raising - Inserting Pin
Other Considerations

• Wellbay issues – remove flowlines, set back pressure valves, remove wing valves, mezzanine deck interference, provide lateral support for wells during jacking op’s

• Caisson sumps, overboard water lines, utility lines, pump casings, etc.

• Pipeline risers (Operators and transmission companies)

• Stairways, crane cables, survival capsule wire, ESD stations, etc.
Wellbay During Jacking
Tree Constraints
Conclusions

- Raising the deck on an offshore platform is feasible
- Decision to raise the deck is easier if the field is shut-in
- Project was accomplished in 8 months from FEED Study through Jacking Operation
- No recordable incidents occurred on the project