PECTEN - SCHLITZ PROJECT:
A Simple and Elegant
Two-Well Subsea Tieback

MARINE TECHNOLOGY SOCIETY
RAMADA INN, KATY FREEWAY
HOUSTON, TEXAS
APRIL 24, 2003
James Pappas
Devon Energy Corporation
HISTORICAL PERSPECTIVE

- Multi-Prospect Play
- 3-D Seismic & AVO Influenced
- Two Single-Well Prospects
- Close Geographic Locations
- Hub Platform in Vicinity
ORIGINAL OBJECTIVES (1999)

- EVALUATE RAINBOW & PECTEN PROSPECTS
- ACCELERATE PRODUCTION VOLUMES
- INCREASE RESERVE BASE
- SEEK OPERATIONAL SYNERGIES
- IMPROVE KNOWLEDGE BASE
- USE NEWER TECHNOLOGY
  - RELATE TO TRIED & TRUE, INEXPENSIVE METHODS
  - ALSO RELATE TO CUTTING EDGE, MORE EXPENSIVE METHODS
- LEARN FROM THE EXPERIENCE
PROJECT MANAGEMENT

- CONSULTANT EVALUATION – 2 WEEKS
- SUBSEA TIEBACKS – PEGASUS INTL.
- FACILITIES UPGRADES – STAR ENGINEERING
- REPORT TO SFS / DEVON CONSTRUCTION ENGINEER
PECTEN ALTERNATIVES EVALUATION

ORIGINALLY 3-WELL PROJECT

VERITAS AVO RESULTS
- RAINBOW (VK 739) - WEAKENED
- PECTEN (VK 739) - STRENGTHENED
- SCHLITZ (VK 694) - STRENGTHENED
- OTHER PROSPECTS: NEWFIELD OPERATED MARIA & TECATE (VK 738)
TECHNOLOGICAL ALTERNATIVES EVALUATION

- OIL or GAS? EXPERIENCES at VK 693 & MP 261
- FLOW ASSURANCE? CONTINGENCIES
- TREES? STEP CHANGE, REDUCED COST & TIMELINE
- CHEMICAL & MeOH INJECTION? DOWN HOLE &/or TREE INJECTION POINTS
- RESERVOIR MONITORING? DOWNHOLE, TREE? ADVANTAGES? RELIABILITY?
- UMBILICAL? HYDRAULIC, ELECTRO-HYDRAULIC, or HYBRID? COSTS? TIMING?
OTHER ALTERNATIVES EVALUATION - PECTEN

- PARTNERS: ELF (TFE), NEWFIELD, PIQUANT

- STRATEGY:
  - FORM UNIT
  - WORK WITH NEWFIELD IN MAIN PASS AREA
  - ELF: IN or OUT? FARM-IN OPPORTUNITY?

- MAIN PASS 259 PLATFORM-EFFECTS?
  - SAME PARTNERS, DIFFERENT INTERESTS
  - COMMON EQUIPMENT UTILIZATION
  - COSTS TO PROCESS
FLOW ASSURANCE

- 600’ +/- WD
- 52-Degree Mudline Temperature
- Probably Gas Wells – Waxy Condensate
- Paraffin Dispersant – Corrosion Inhibitor Cocktail Injection
- Flow Above Hydrate Region
- Transient Conditions to Require Methanol Injection
Possible Oil Well(s)
Asphaltenes – Possible, But Not Probable
Distances
  - Pecten-to-MP 259 “A” Platform – 5 Miles
  - Schlitz-to-MP 259 “A” Platform – 3 Miles
  - Pecten-to-Schlitz – 3 Miles
Flow Loop (4-1/2”) to Add 1 Mile of Flowline
Flow Line to Allow for Round-Trip Pigging
Second Well Pipeline Sled - 50’ from Prospect
UMBILICAL DESIGN

- SCSSV – Single Conventional 10,000#
- Tree Injection Necessary
- Downhole Injection Possibly Needed
- Pressure/Temperature Decision
  - Reservoir Management – Previous Experiences
  - Reliability Issues - Backup
- Subsea Chokes – Not Needed
- Wells Relative Locations & Exploratory Status – Two Direct Hydraulic Lines Preferable
UMBILICAL CROSS-SECTION

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<thead>
<tr>
<th>IDENT</th>
<th>SIZE</th>
<th>LINE FUNCTION</th>
<th>W.P.</th>
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<tbody>
<tr>
<td>1</td>
<td>1/2&quot;</td>
<td>PRODUCTION WING VALVE</td>
<td>5,000 psi</td>
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<tr>
<td>2</td>
<td>3/8&quot;</td>
<td>CHEMICAL INJECTION VALVE</td>
<td>5,000 psi</td>
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<tr>
<td>3</td>
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<td>CROSS OVER VALVE</td>
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<td>DOWN HOLE CHEMICAL INJECTION VALVE</td>
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<td>PRODUCTION UPPER MASTER VALVE</td>
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<td>SURFACE CONTROLLED SUBSURFACE SAFETY</td>
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<td>11</td>
<td>1/2&quot;</td>
<td>HIGH PRESSURE SPARE</td>
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<td>12</td>
<td>3/8&quot;</td>
<td>PIGGING INSTALLATION VALVE</td>
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FILLERS

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<tr>
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<td>C</td>
<td>Ø0.640&quot;</td>
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<tr>
<td>D</td>
<td>Ø0.710&quot;</td>
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Polychorine INNER SHEATH 0.190" NOMINAL THICKNESS
(2) #16 AWG TWISTED SHIELDED JACKETED PAIR
56/82 NOMINAL ARMOR PACKAGE #0.102" GALVANIZED STEEL WIRE 0/5 TO Ø0.220
NON-METALIC FILLER
POLYETHYLENE OUTER SHEATH (YELLOW) 0.250" NOMINAL THICKNESS

Devon Energy Corporation
<table>
<thead>
<tr>
<th>Item</th>
<th>Pre-investment</th>
<th>Time Savings</th>
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</thead>
<tbody>
<tr>
<td>Subsea Tree</td>
<td>$0.8 MM</td>
<td>4 Months</td>
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<tr>
<td>Umbilical - queue</td>
<td>$0.1 MM</td>
<td>3 Months</td>
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<tr>
<td>Flowline – Stolt Agrmt</td>
<td>$0.1 MM</td>
<td>2 Months</td>
</tr>
<tr>
<td>Down Hole Controls</td>
<td>$0.4 MM</td>
<td>5 Months</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$1.4 MM</strong></td>
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</table>
PECTEN WELL TREE
Pecten Well Drilled & Completed
Ordered Subsea Equipment & Installed
  - Included:
    - Schlitz Sled: ~ $100K
    - Dual-Well Heater: Used with Outside Operator’s New Well
    - Topside Control Box for Second Well: ~$50K
    - Second I-Tube: ~$150K
Pecten First Production – March 2001
PECTEN WELL TREE
INSPECTION - THROUGH MOONPOOL - SPLASHDOWN
MAIN PASS 259 "A"
PLATFORM - STOLT SEAWAY FALCON
PECTEN UMBILICAL
PECTEN TREE
ROV PANEL

J-PLATE

Note J-Plate Cover
# PECTEN PROJECT SCHEDULE

<table>
<thead>
<tr>
<th>MONTH</th>
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<tr>
<td>LONG-LEAD ITEMS</td>
<td>T</td>
<td>C</td>
<td>U, F</td>
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<td>DRILL &amp; COMPLETE, FLOW TEST</td>
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<td>SUBSEA TIEBACK, FIRST PRODUCTION</td>
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**Legend:**
- **PLANNED**  
  - T = Tree  
  - U = Umbilical Eqpt  
- **ACTUAL**  
  - C = Controls  
  - F = Flowline Eqpt
PECTEN WELL
PRE-INVESTMENT IMPACT

Pre-Investment - $1.4 MM

Cycle Time Reduction - 0 Months

Holding Costs - $0

\( NPV_{10} \text{ Impact} - (\$0.1 \text{ MM}) \)
PECTEN WELL FINAL COSTS

Drilling $3.8 MM
Completion $6.5 MM
Tieback & HPU * $7.8 MM
Topsides * $2.3 MM

TOTAL PROJECT $20.4 MM

Note: * Tieback & Topsides costs include 4-well scope
## PECTEN LESSONS LEARNED

<table>
<thead>
<tr>
<th>Issue</th>
<th>Action - Lesson</th>
<th>Economic Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Delivery/ Documentation</td>
<td>Full-time project manager &amp; note in P.O.</td>
<td>POTENTIAL $50M/Day</td>
</tr>
<tr>
<td>FAT, SIT, &amp; Installation Schedule Standards/ Deadlines</td>
<td>Monetary penalties in P.O. for failure to meet either</td>
<td>$300M</td>
</tr>
<tr>
<td>Umbilical Manufacturing Interruptions</td>
<td>Manufacturer to add backup power generation per P.O. if critical</td>
<td>POTENTIAL $750M (1.5 mo delay)</td>
</tr>
<tr>
<td>Riser, I-Tube, &amp; Subsurface Installation GOM Experience</td>
<td>Contactor assurance of qualified critical personnel &amp; include monetary penalties for failure to meet</td>
<td>$100M (3rd parties hired to rewrite procedures &amp; oversee)</td>
</tr>
</tbody>
</table>
## PECTEN LESSONS LEARNED – contd.

<table>
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<tbody>
<tr>
<td>Topsides Manufacturing Delays</td>
<td>Include Manufacturers in determining project scope, scheduling, contingencies, &amp; problem-solving. Company rep to accompany project manager on regular site visits</td>
</tr>
<tr>
<td></td>
<td><em>Economic Impact</em> $375M (2 week production delay)*</td>
</tr>
<tr>
<td>Tree – Project Management Interface</td>
<td>Project Manager to liaison with well engineers &amp; production engineer. Single source authorized over manufacture &amp; delivery of tree, tools, test tree, &amp; related controls.</td>
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<tr>
<td></td>
<td><em>Economic Impact</em> $200M</td>
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SCHLITZ WELL: RECALL ...

- Pecten Well Drilled & Completed
- Ordered Subsea Equipment & Installed
  - Included:
    - *Schlitz* Sled: ~ $100K
    - Dual-Well Heater: Used with Outside Operator’s New Well
    - Topside Control Box for Second Well: ~$50K
    - Second I-Tube: ~$150K
## SCHLITZ WELL
**PRE-INVESTMENT STRATEGY**

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<td><strong>TOTAL</strong></td>
<td><strong>$2.7 MM</strong></td>
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SCHLITZ WELL
SUBSEA TREE

Kvaerner Oilfield Products
SCHLITZ WELL
UMBILICAL, UTA, & FLYING LEAD
SCHLITZ WELL
UMBILICAL INSTALLATION VESSEL
SCHLITZ WELL
ONBOARD JUMPER FABRICATION
SCHLITZ WELL
HARNESSED JUMPER

Note Extension
SCHLITZ WELL
JUMPER STAB-OVER
SCHLITZ WELL
UMBILICAL TERMINATION ASSEMBLY

Note ROV

Note Hard Suit
SCHLITZ WELL
TUTA & HPU
## SCHLITZ PROJECT SCHEDULE

<table>
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<tr>
<th>MONTH</th>
<th>April</th>
<th>May</th>
<th>June</th>
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<td><strong>OPERATION</strong></td>
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### LEGEND:
- **PROPOSED**
- **ACTUAL**

- 9/20
- 11/4
SCHLITZ WELL
PRE-INVESTMENT IMPACT

Pre-Investment - $2.7 MM

Cycle Time Reduction - 5 Months

Holding Costs - $175,000

$NPV_{10} Impact - $1.1 MM
SCHLITZ WELL
FINAL COSTS

Drilling $ 3.9 MM
Completion $ 7.6 MM
Tieback & HPU $ 2.8 MM
Topsides $ 0.8 MM
TOTAL PROJECT $15.1 MM
### SCHLITZ WELL
### LESSONS LEARNED

<table>
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<tr>
<th>Issue</th>
<th>Action - Lesson</th>
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<tbody>
<tr>
<td>Late procedures</td>
<td>Earlier Service Company Participation</td>
<td>POTENTIAL $100M/Day</td>
</tr>
<tr>
<td>Simultaneous TUTA &amp; Umbilical Pull Installations on Platform</td>
<td>Plan Complementary Work Activities</td>
<td>SAVED $100M</td>
</tr>
<tr>
<td>Platform Operations Coordinator for Multiple Projects</td>
<td>Continue Practice – Assign Ops Coordinator if Simultaneous Projects</td>
<td>?</td>
</tr>
<tr>
<td>Rigging Failed &amp; Umbilical Kinked at Termination During Re-Spooling</td>
<td>Re-Terminated. Determined Cause in Rigging Failure &amp; Altered Procedures</td>
<td>SAVED $160M</td>
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<tr>
<td>Issue</td>
<td>Action - Lesson</td>
<td>Economic Impact</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<td>-----------------</td>
</tr>
<tr>
<td>Simultaneous Drilling &amp; Umbilical Installation</td>
<td>Plan Accordingly</td>
<td>SAVED $200M</td>
</tr>
<tr>
<td>Extra Long Flying Leads to Reach From Sled to Tree with Rig Skidded</td>
<td>Consider Flying Lead Length, Installer, &amp; Drilling Vessel Earlier</td>
<td>SAVED $100M</td>
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<tr>
<td>Rig POB Issues: Could Not Install FL Jumper/Prep for final SS Test During Completion</td>
<td>Single Person Designated Responsible for Prioritizing POB on Rig</td>
<td>$600M</td>
</tr>
<tr>
<td>Incorrect Jumper Measurement - Fabrication With Oncoming Storm</td>
<td>Metrology – Human Error, Revised Procedure/Checklist</td>
<td>$200M</td>
</tr>
</tbody>
</table>
PECTEN - SCHLITZ
PROJECT SUMMARY

- Pre-ordering long-lead items can save money & headaches
- Planning ahead for add-ons is wise
- First production can be achieved sooner
- Total costs can be reduced
ACKNOWLEDGEMENTS

Special thanks to the following for their assistance, expertise, & time:

- Devon Energy Corporation Management
- Raymond Maggiore, Dan Postler, Danny Hogan, Scott Bennett, David Pettus, & Harry Leonard – Devon
- Jim Riley & Bob Starr - Pegasus International
- Ron Marcomb, Steve Croft, & Robert Montes - Star Engineering Services
- Stolt Offshore
- DrilQuip
- Oceaneering International & Multiflex
- Aker Kvaerner
- Wood Group
THANK YOU

Questions?