

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

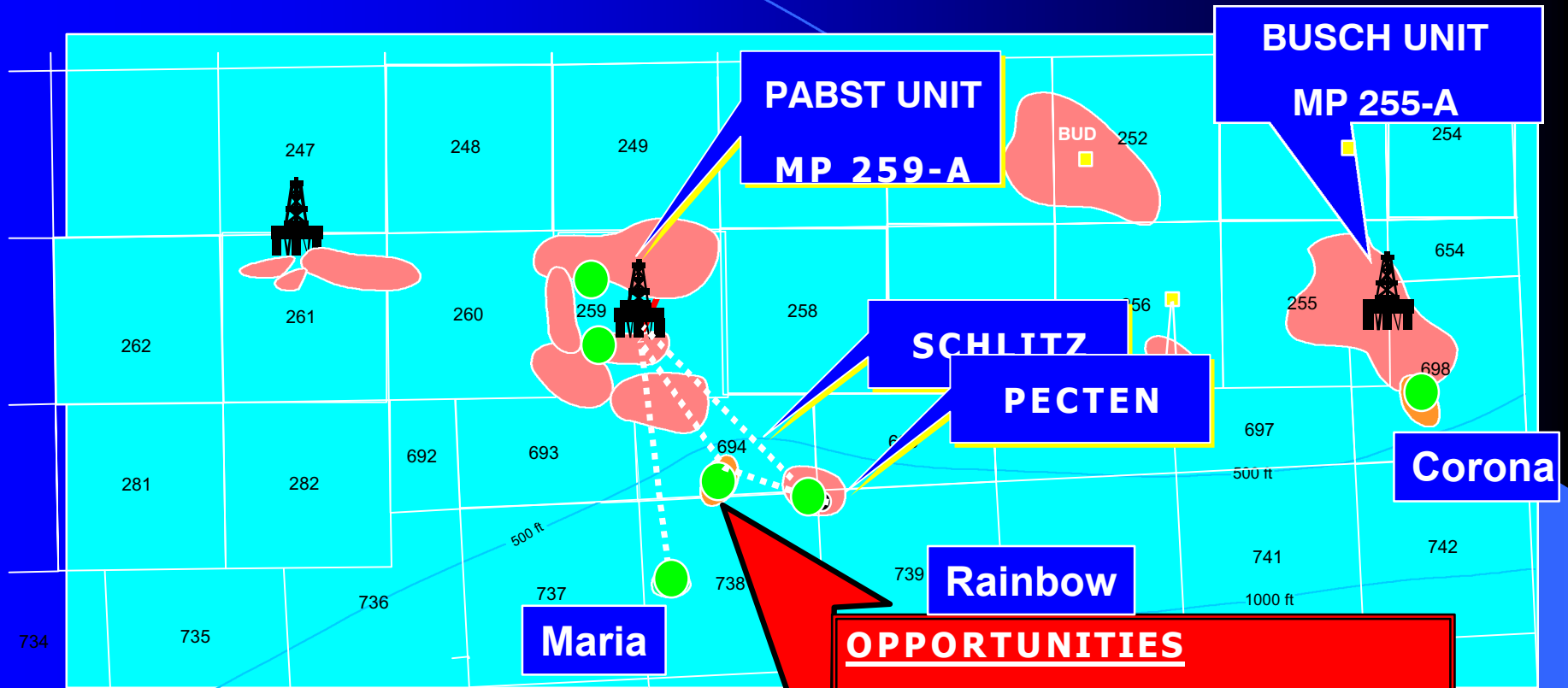
HISTORICAL PERSPECTIVE

- 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

LOCATION MAP



VK 694 PROSPECT

-  Key Opportunities
-  Field
-  Discovery

OPPORTUNITIES

- PECTEN
- SCHLITZ

PROJECT MANAGEMENT

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

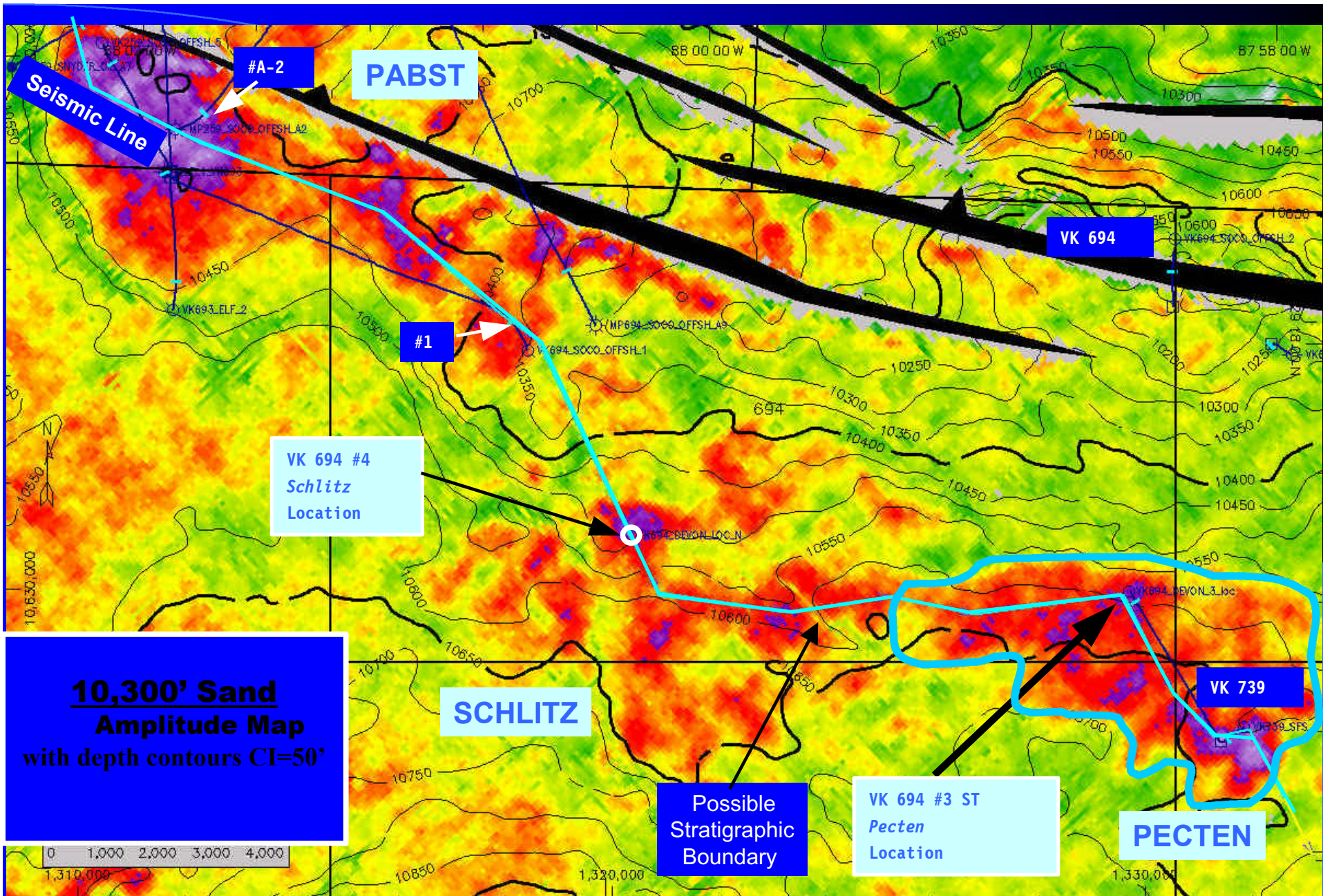


PECTEN ALTERNATIVES EVALUATION

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)



**10,300' Sand
Amplitude Map
with depth contours CI=50'**

AMPLITUDE MAP

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

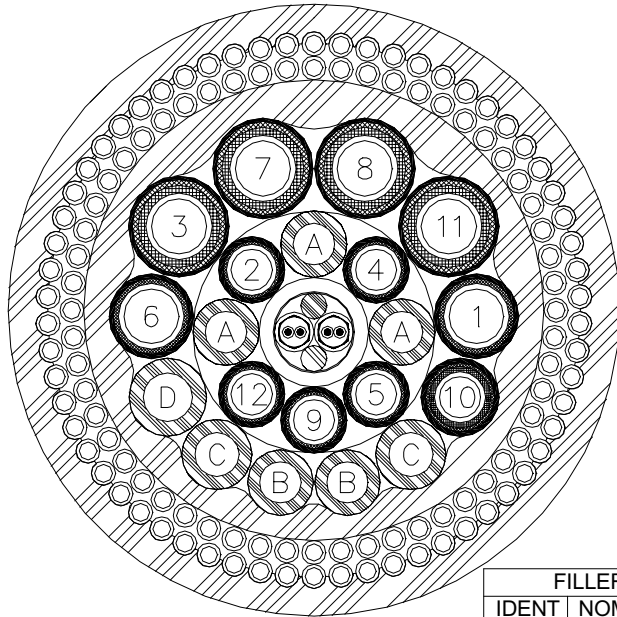
PIPELINE DESIGN

- 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

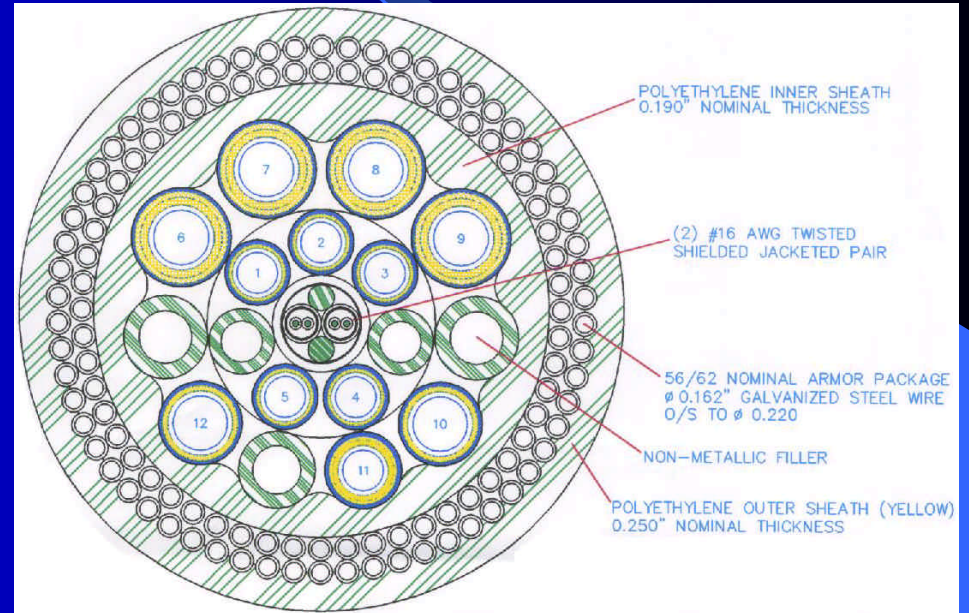
UMBILICAL CROSS-SECTION



FILLERS	
IDENT	NOM. O.D.
A	Ø0.605"
B	Ø0.600"
C	Ø0.640"
D	Ø0.710"

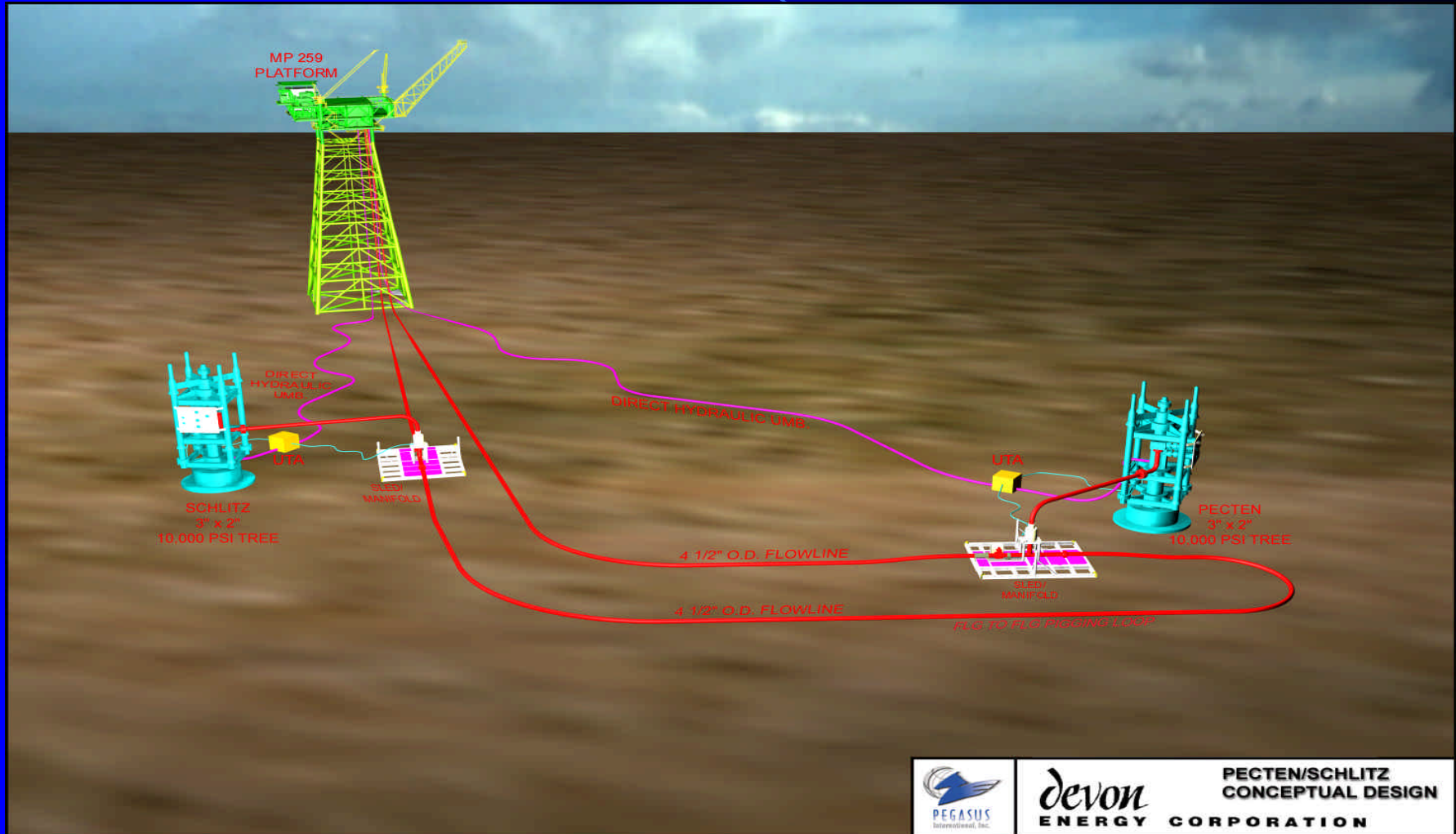
IDENT	SIZE	LINE FUNCTION	W.P.
1	1/2"	PRODUCTION WING VALVE	5,000 psi
2	3/8"	CHEMICAL INJECTION VALVE	5,000 psi
3	1/2"	CHEMICAL INJECTION	10,000 psi
4	3/8"	CROSS OVER VALVE	5,000 psi
5	3/8"	DOWN HOLE CHEMICAL INJECTION VALVE	5,000 psi
6	1/2"	PRODUCTION UPPER MASTER VALVE	5,000 psi
7	1/2"	DOWN HOLE CHEMICAL INJECTION	10,000 psi
8	1/2"	ANNULUS MONITOR	10,000 psi
9	3/8"	ANNULUS MASTER VALVE	5,000 psi
10	3/8"	SURFACE CONTROLLED SUBSURFACE SAFETY VALVE	10,000 psi
11	1/2"	HIGH PRESSURE SPARE	10,000 psi
12	3/8"	PIGGING INSTALLATION VALVE	5,000 psi

Devon Energy Corporation



OCEANEERING

PECTEN – SCHLITZ CONCEPT



PECTEN/SCHLITZ
CONCEPTUAL DESIGN

PECTEN WELL PRE-INVESTMENT STRATEGY

<u>Item</u>	<u>Pre-investment</u>	<u>Time Savings</u>
Subsea Tree	\$0.8 MM	4 Months
Umbilical - queue	\$0.1 MM	3 Months
Flowline – Stolt Agrmt	\$0.1 MM	2 Months
Down Hole Controls	\$0.4 MM	5 Months
<u>TOTAL</u>	<u>\$1.4 MM</u>	

PECTEN WELL TREE

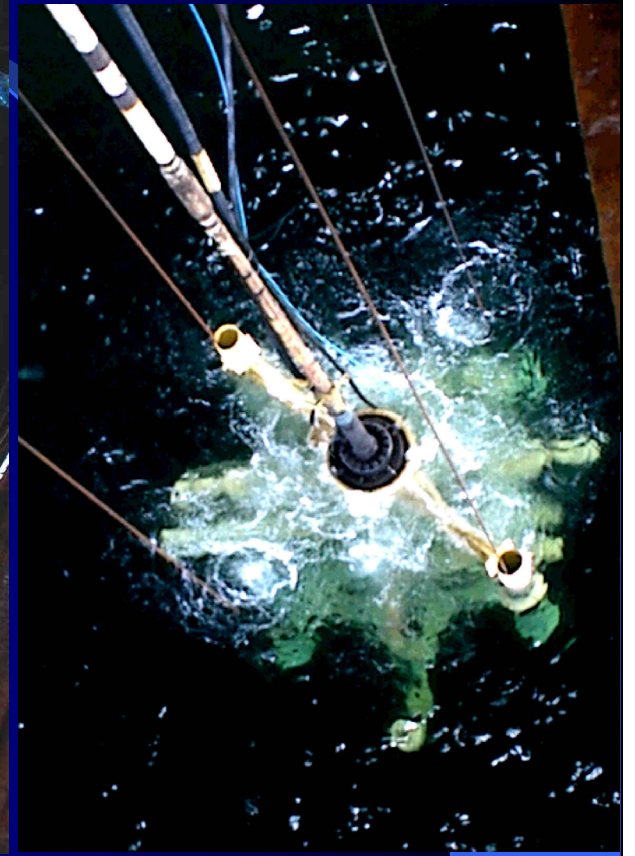


FIRST WELL

- 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 WELL PRODUCTION MODULE



ADVANCED OFFSHORE

1/13/2001 9:39am

PECTEN WELL PRODUCTION MODULE INSTALLATION



PECTEN PROJECT SCHEDULE

MONTH	03/00	04/00	05/00	06/00	07/00	08/00	09/00	10/00	11/00	12/00	01/01	02/01	03/01
<u>OPERATION</u>													
COSTING, ENGINEERING, AFE's & SANCTION		Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Actual	Actual	
PERMITTING		Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	Planned	
LONG-LEAD ITEMS			Planned	Planned	Planned	Planned	Planned						
		Actual			Actual		Actual	Actual					
DRILL & COMPLETE, FLOW TEST					Planned	Planned	Planned						
					Actual	Actual	Actual						
SUBSEA TIEBACK, FIRST PRODUCTION										Planned	Planned	Planned	Planned
										Actual	Actual	Actual	Actual

LEGEND:

Planned
Actual

T = Tree
C = Controls

U = Umbilical Eqpt
F = Flowline Eqpt

03/01

03/10

PECTEN WELL PRE-INVESTMENT IMPACT

Pre-Investment - \$1.4 MM

Cycle Time Reduction - 0 Months

Holding Costs - \$0

NPV₁₀ Impact – (\$0.1 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

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

PECTEN LESSONS LEARNED – contd.

<u>Issue</u>	<u>Action - Lesson</u>	<u>Economic Impact</u>
<p>Topsides Manufacturing Delays</p>	<p>Include Manufacturers in determining project scope, scheduling, contingencies, & problem-solving. Company rep to accompany project manager on regular site visits</p>	<p>\$375M (2 week production delay)</p>
<p>Tree – Project Management Interface</p>	<p>Project Manager to liaison with well engineers & production engineer. Single source authorized over manufacture & delivery of tree, tools, test tree, & related controls.</p>	<p>\$200M</p>

SCHLITZ WELL: RECALL ...

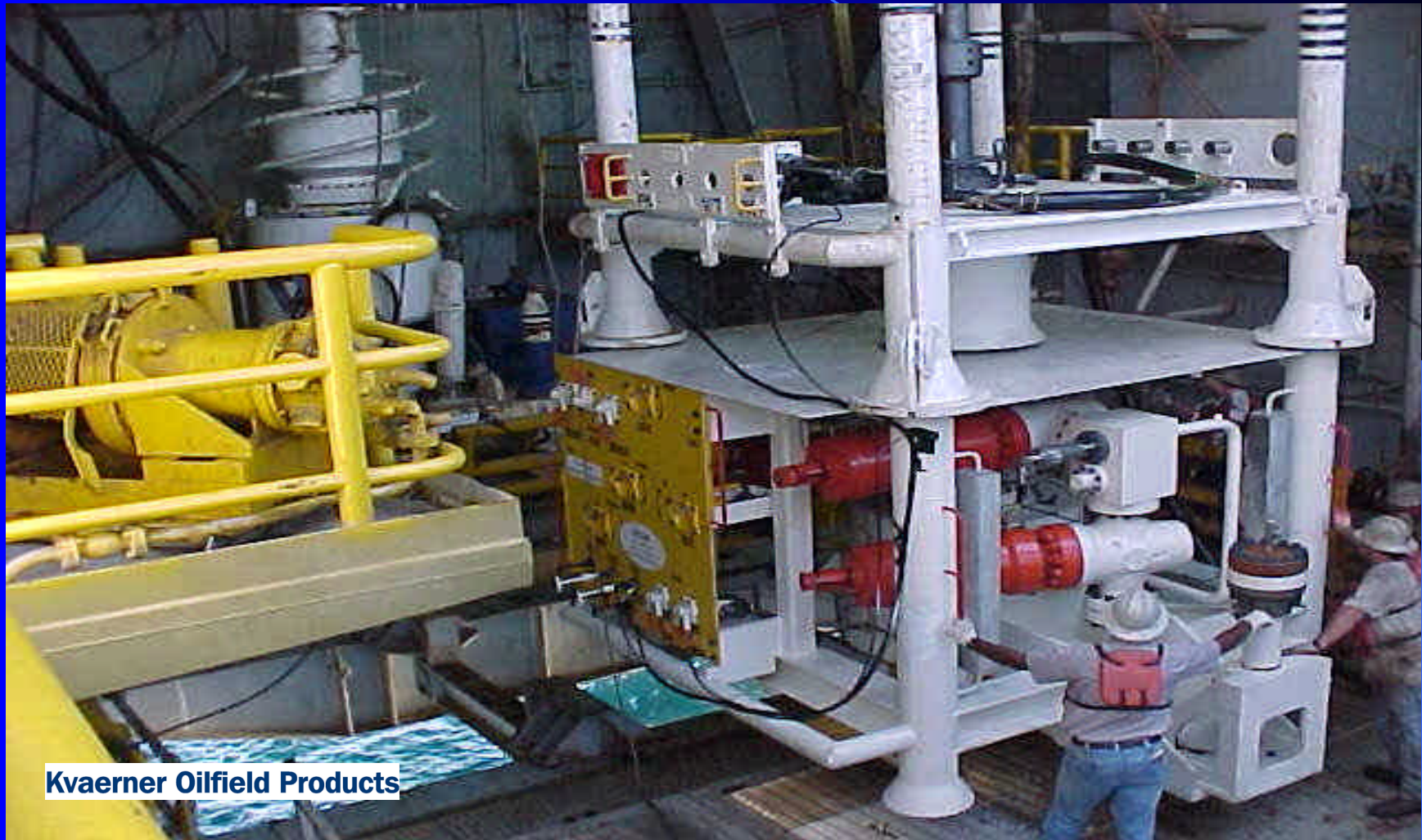
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SCHLITZ WELL

PRE-INVESTMENT STRATEGY

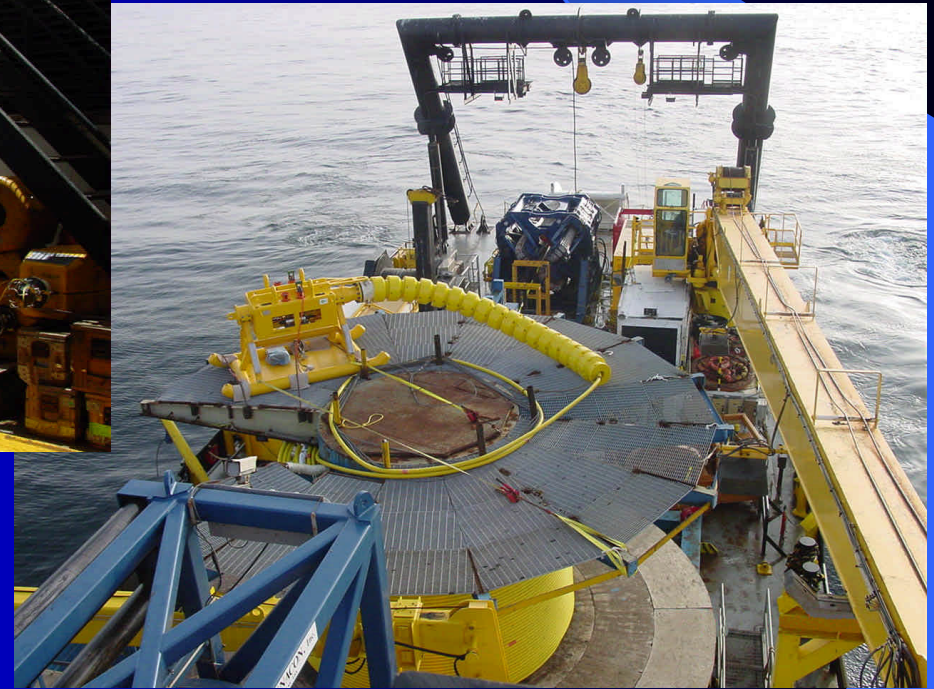
<u>Item</u>	<u>Pre-investment</u>	<u>Time Savings</u>
Subsea Tree	\$1.0 MM	4 Months
Umbilical	\$1.4 MM	3.5 Months
Down Hole Controls	\$0.3 MM	5 Months
<u>TOTAL</u>	<u>\$2.7 MM</u>	

SCHLITZ WELL SUBSEA TREE



Kvaerner Oilfield Products

SCHLITZ WELL UMBILICAL, UTA, & FLYING LEAD



SCHLITZ WELL UMBILICAL INSTALLATION VESSEL



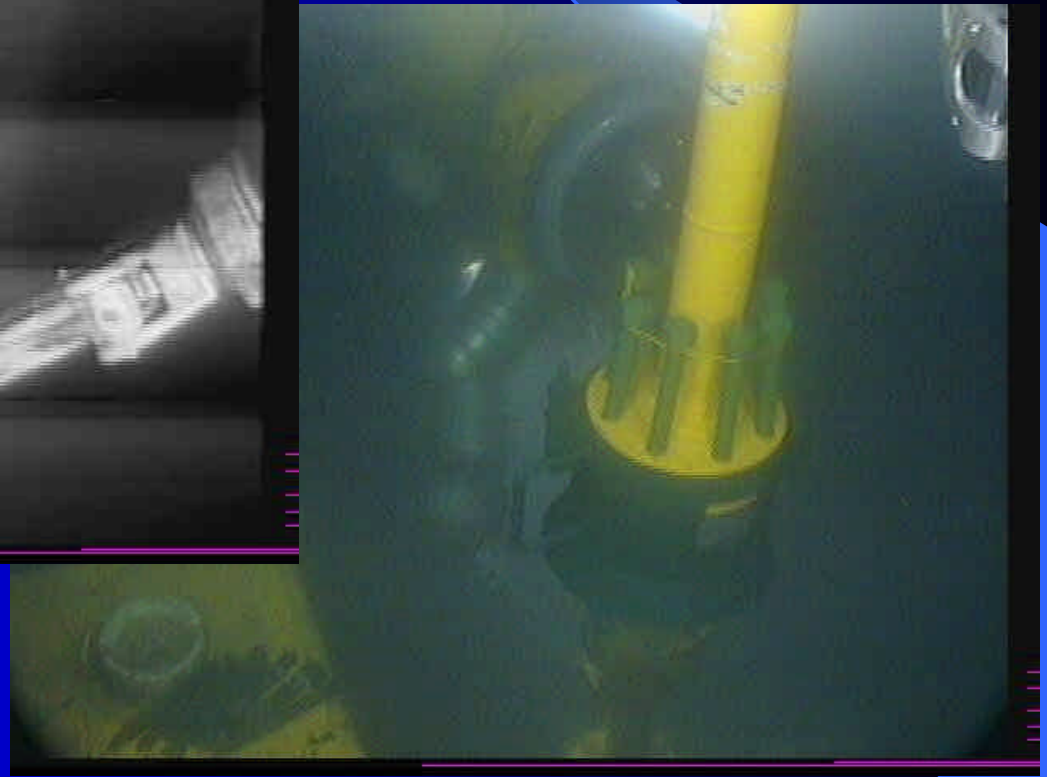
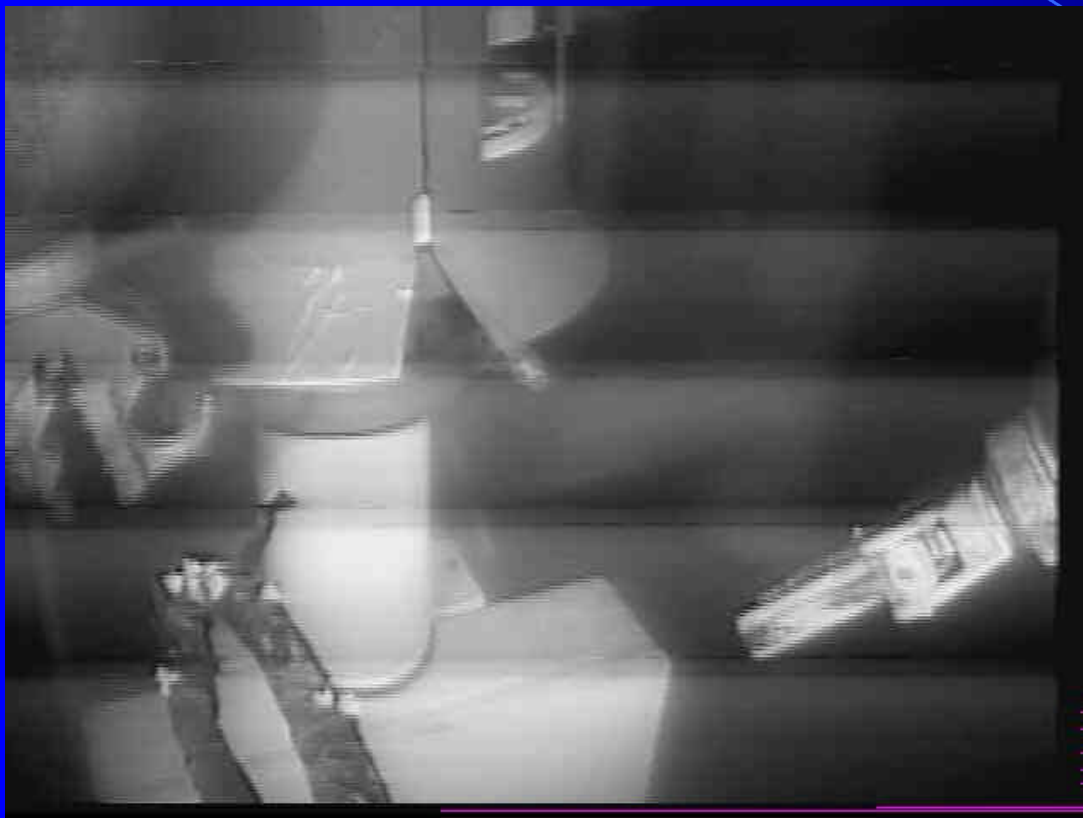
SCHLITZ WELL ONBOARD JUMPER FABRICATION



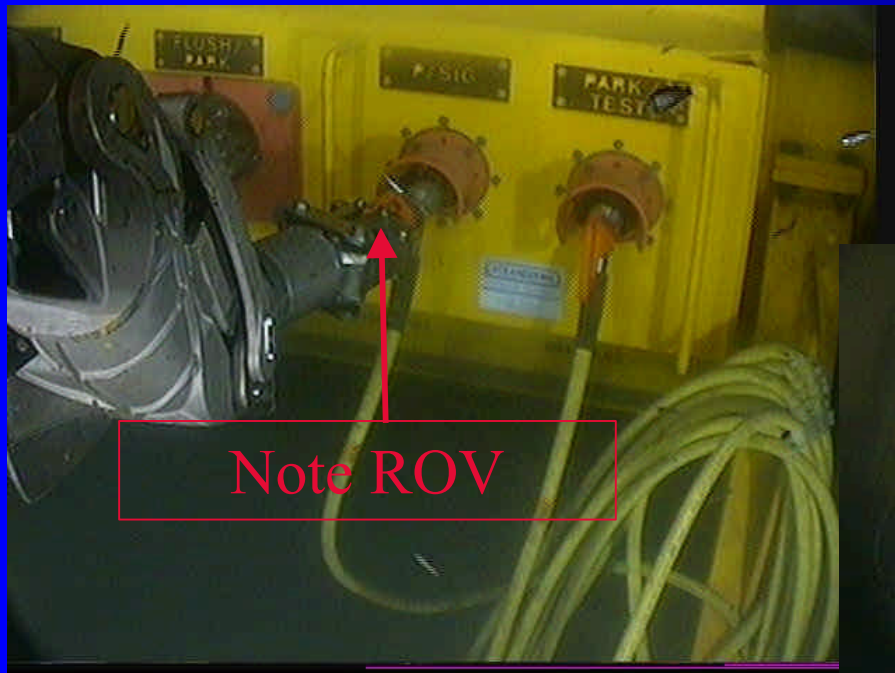
SCHLITZ WELL HARNESSED JUMPER



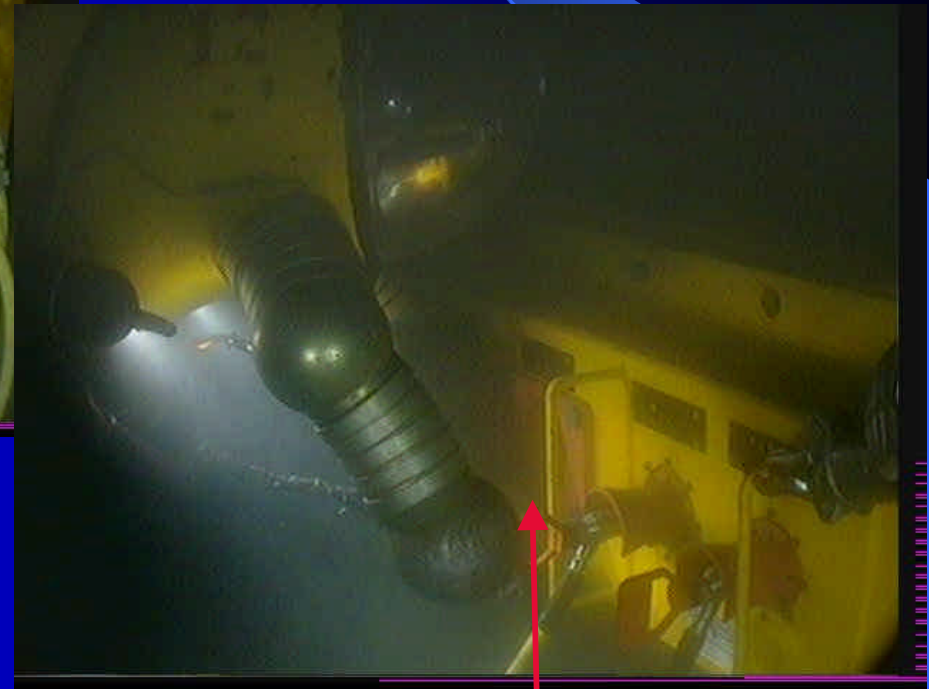
SCHLITZ WELL JUMPER STAB-OVER



SCHLITZ WELL UMBILICAL TERMININATION ASSEMBLY

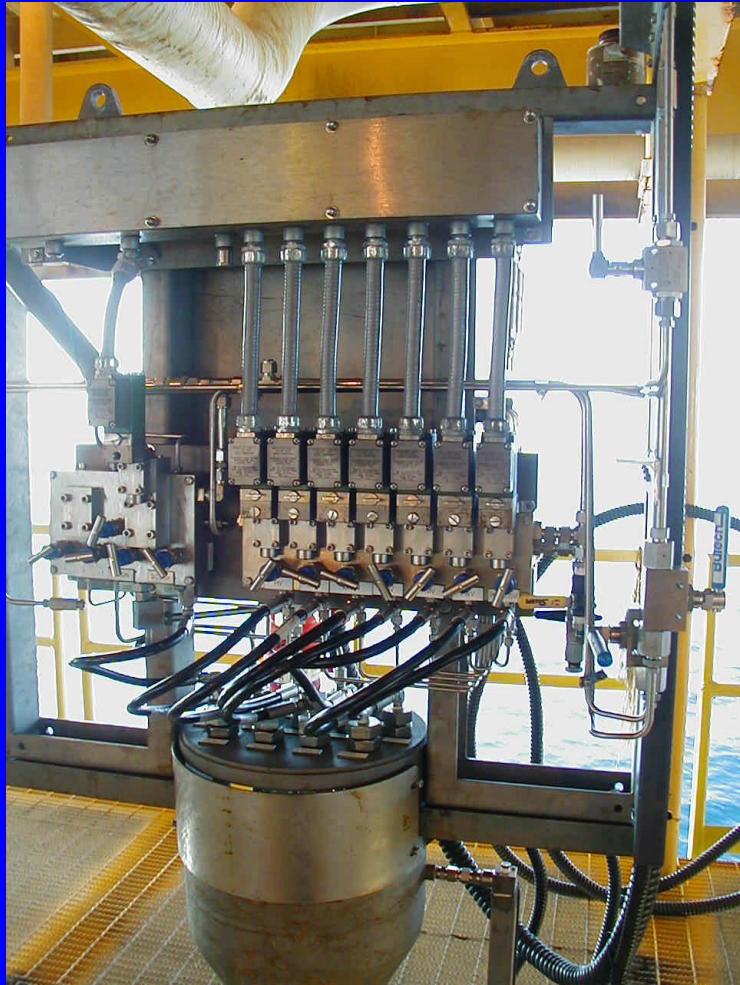


Note ROV



Note Hard Suit


SCHLITZ WELL TUTA & HPU



SCHLITZ PROJECT SCHEDULE

MONTH	April	May	June	July	August	September	October	November
<u>OPERATION</u>								
COSTING, ENGINEERING, AFE's, SANCTION	Proposed	Proposed	Proposed	Proposed	Proposed			
PERMITTING		Proposed	Proposed	Proposed	Proposed	Proposed		
LONG-LEAD ITEMS	Proposed	Proposed	Proposed	Proposed	Proposed	Proposed		
DRILL & COMPLETE, FLOW TEST				Actual	Proposed	Proposed	Proposed	
SUBSEA TIEBACK, FIRST PRODUCTION						Actual 9/20	Proposed 11/4	

LEGEND:

 PROPOSED
 ACTUAL

SCHLITZ WELL
PRE-INVESTMENT IMPACT

Pre-Investment - \$2.7 MM

Cycle Time Reduction - 5 Months

Holding Costs - \$175,000

NPV₁₀ 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

<u><i>Issue</i></u>	<u><i>Action - Lesson</i></u>	<u><i>Economic Impact</i></u>
Late procedures	Earlier Service Company Participation	POTENTIAL \$100M/Day
Simultaneous TUTA & Umbilical Pull Installations on Platform	Plan Complementary Work Activities	SAVED \$100M
Platform Operations Coordinator for Multiple Projects	Continue Practice – Assign Ops Coordinator if Simultaneous Projects	?
Rigging Failed & Umbilical Kinked at Termination During Re-Spooling	Re-Terminated. Determined Cause in Rigging Failure & Altered Procedures	SAVED \$160M

SCHLITZ WELL

LESSONS LEARNED – contd.

<u>Issue</u>	<u>Action - Lesson</u>	<u>Economic Impact</u>
Simultaneous Drilling & Umbilical Installation	Plan Accordingly	SAVED \$200M
Extra Long Flying Leads to Reach From Sled to Tree with Rig Skidded	Consider Flying Lead Length, Installer, & Drilling Vessel Earlier	SAVED \$100M
Rig POB Issues: Could Not Install FL Jumper/Prep for final SS Test During Completion	Single Person Designated Responsible for Prioritizing POB on Rig	\$600M
Incorrect Jumper Measurement - Fabrication With Oncoming Storm	Metrology – Human Error, Revised Procedure/Checklist	\$200M

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

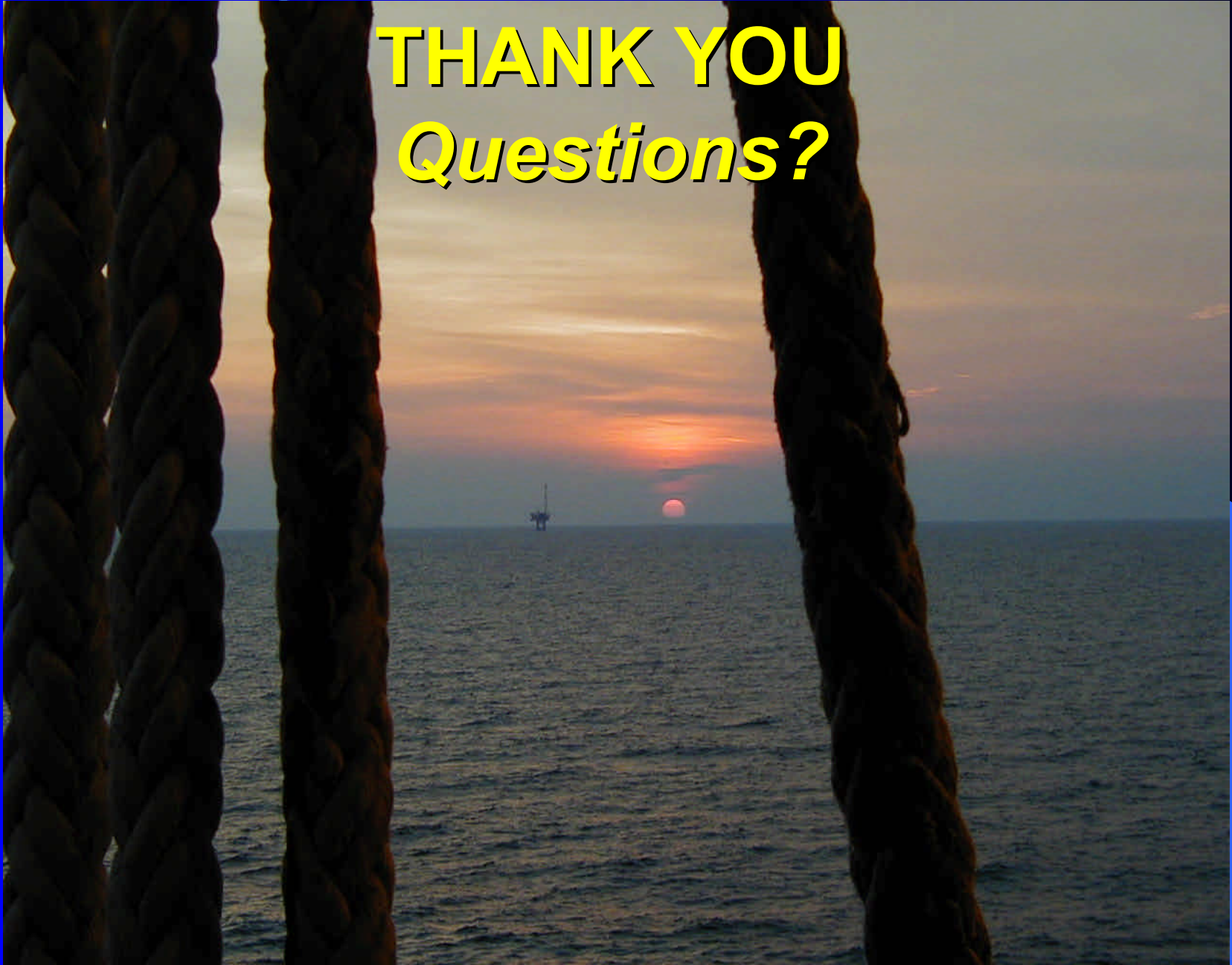
ACKNOWLEDGEMENTS

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- *DrilQuip*
- *Oceaneering International & Multiflex*
- *Aker Kvaerner*
- *Wood Group*



THANK YOU
Questions?



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