Aspen 5

Relationships and Technology

Marine Technology Society

June 28, 2007
Aspen

- Block Green Canyon 243
- Water depth 3,050ft
- Lease purchased in 1998 by Vastar Resources
- Vastar purchased by BP in 2000 as part of approximately 50 prospects
- BP original operator with 80%
- Nexen increased ownership to 40% during original development and bought out BP at startup
GC 243 and Surrounding Area
Aspen Timeline

- 2002: Drill Expl Wells, Drill / Compl Wells, Aspen I First Oil
- 2003: Phase II Well #3, Phase II Well #4, Install & Commission
Aspen Phase I (Well #1 and #2)

3,050ft x 16 miles subsea oil tieback
Flowline Initiation

**Diagram Description**

1. There is no mention of attaching the 2-1/8" PLEM Support Cable to the PLEM.
2. Is this done when the PLEM is on the DB16 or is it done underwater? Also, when the load is transferred from the DB16 crane to the PLEM Support Cable, is the DB16 crane line cut with an ROV?
3. Although the procedure states that the MSV will come no closer than 83 ft to the Rig, the drawing shows that the MSV will be much closer, i.e., the distance shown in the drawing is not accurate.
4. What happens after Step 5? Need to state that the PLEM Support Pull-in Cable are removed and retrieved.

**Table**

<table>
<thead>
<tr>
<th>Water Depth (ft)</th>
<th>Pipe Fringe</th>
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<tbody>
<tr>
<td>3000</td>
<td>7.00&quot; x 0.8</td>
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**Flowline Initiation Procedure**

**Step 1**
1. The barge is positioned such that the suction pile and the stern of the D rig are on the suction pile and brought up.
2. The stinger is raised to the water line.
3. The cable from the suction pile is on the PLEM, and the FL block is lowered off the support cables. The FL block is raised on the masts of the stinger.
4. Pipe is paid out and a reserved flange STOP is continued until the end weld neck flange on the PLEM pipe is clear of the barge.
5. Pipe is paid out until the end weld neck flange is on the PLEM pipe. PLEM is still supported by the flange.

**Step 2**
1. Pipe is paid out and cable is pinched MSV until the PLEM has cleared.
2. Stinger lowered to lay position.
3. Pipe payout (and simultaneous on the stinger). PLEM voice burial in stages of the table, using the DI.

**Step 3**
1. Once the PLEM has cleared the DB16 crane.
2. PLEM yoke hanger elevation is not second winch on the MSV.

**Step 4**
1. Pipe payout (and simultaneous on the desired target box). The pipeline is monitored using an ROV during a full payout.
2. When MSV comes within 83 ft of the ROV, it continues to support the PLEM.
3. PLEM is on the desired target box.
4. ROV attachment of 100-ft long cable is supported so as to maintain the position of the ROV.
Flowline Initiation
Aspen Phase II (Well #3)
Aspen Phase II (Well #4)
Who moved the oil?
Aspen Phase II Inventory

- Spare tree
- Manifold
- Infield flowline
- Flexible jumper
- Infield umbilical
- Flying leads
- Installation engineer
Subsea Architecture (dual flowlines)

- Well #3
- Well #4
- Well #5
- Flowline Long #1: 4,250 ft
- Flowline Long #2: 4,250 ft
- Well #1
- Well #2
- Well #4
- Well #5
Selected Architecture

Well #3

Well #1

Well #2

Well #4

Well #5

4,250 ft
Flowline Long #1
Aspen 5 (Aspen)
Aspen 5 (Well #5)
Aspen 5 Timeline

- **2005**
  - Concept Selection
  - Eng. & Procure
  - Installation Tenders
  - Earliest First Oil
  - Rig with Partner
  - Hurricane Ivan

- **2006**
  - Rig Repairs
  - Rig Starts Drilling
  - Well #5 First Oil
  - Well #1ST6 First Oil

- **2007**
  - Hurricane Katrina
  - Hurricane Rita
  - Managing Change
  - Install & Commission
  - Earliest First Oil
Market Conditions Changed

1. High oil price = high activity (worldwide)
2. Numerous deepwater/subsea developments = high activity
3. Investment lag = limited vessels
4. Hurricane damage = high activity and low resources
5. Relatively new industry and lack of training = skilled resource limitations
Industry Problem

Oil Company  Contractor
Example - Installation Contract

- Lump sum / fixed price
- Multiple contractors responded
- Prices were higher than anticipated
- Vessel availability limited
  - drilling rig schedule kept moving
- Selected a vendor and worked schedules
  - Vessel already contracted
- Reduced price by minimizing contractor risk
  - Removed equipment mobilization from work scope
  - Single installation campaign
  - Equipment installation ready (installation aids)
  - Removed hydrotest from work scope
  - Weather downtime (13 days + 5 days weather)
Cut the Manifold in Half
Cut the Manifold in Half
Flexible Flowline

- 5.25” ID
- ~13” OD
- ~2” of insulation
- 10,000psi
Original Flowline SIT

Positioning Over Mock Stand

FEB 26 2004
Jumper and PLEM SIT
Single Crane Installation
Double Crane Installation
Mobilizing Equipment
Mobilizing Equipment
Mobilizing Equipment
Winter Weather
PLEM Installation
Installing PLEM C
Flowline Installation
Flowline Installation
Attaching the Gooseneck
Installing the Umbilical
Attaching the UTA Mud Mat
Umbilical Over Boarding
Jumper Installation
Conclusions

• Proven deepwater/subsea building blocks

• Careful contracting and open relationships can reduce risks and costs

• Market conditions have changed and industry needs to work together on a long term plan

• Thank you to everybody who helped make Aspen a success